TOWN OF ONOWAY CAPITAL PLAN 2021 - 2026

ASSET GROUP	2021	2022	2023	2024	2025	2026	NOTES:
BUILDINGS							
PW SHOP FACILITY		$ 80,000.00					Lunch room rebuild
AIR EXCHANGE - FIRE DEPARTMENT BAY	$ 32,000.00						
ADMINISTRATION FURNACE ROOM		$ 15,000.00					
MACHINERY AND EQUIPMENT							
MOWER REPLACEMENT	$ 35,000.00						
PW TRUCK	$ 40,000.00						
SIDEWALKS AND TRAILS							
SIDEWALK REPLACEMENT							Cyclinical plan - every three years - Gas Tax Fund
ROADWAY INFRASTRUCTURE							
MILLER DR/44ST.							
BACK ALLEY PROJECT	$ 390,000.00						
CHIP SEAL LAC STE. ANNE TRAIL NORTH & SOUTH					$ 200,000.00		
WATER/WASTE WATER							
VALVE AND HYDRANT REPLAYMENT	$ 75,000.00	$ 85,000.00	$ 85,000.00				
METER READER	$ 15,000.00						
WTP AND LIFT STATION COMPUTER			$ 40,000.00				
LAGOON DESLUDGING PROGRAM	$ 190,000.00						
RIP RAP AT LAGOON	$ 40,000.00						
SURVEY AND MAP VALVES, HYDRANTS, MANHOLES, CC, ETC.							
STORM WATER REHAB		$ 40,000.00	$ 25,000.00				
SEWER LINE RELINING				$ 150,000.00	$ 150,000.00		
TOTAL	$ 817,000.00	$ 220,000.00	$ 150,000.00	$ 150,000.00	$ 350,000.00		

ASSET GROUPINGS NOT USED IN FIVE-YEAR PLAN

Electronic Hardware/Software
Land Develoment
Parks and Open Space
Public Works Shop Building

***Road rehabilation will require borrowing or fudning discussions and approval.**

Operating Lagoon dredging annually

Five Year Capital Plan Descriptions

2022

Shop Facility- 80,000

Demo existing lunchroom and rebuild with a proper grade beam foundation to eliminate water from leaking in during the spring thaw and heavy rainfalls. Another option is to purchase a skid trailer with office, lunch room and washrooms and set up.

Admin Furnace Room- 15,000

Replacement of furnaces, as parts are no longer available to repair.

Valve and hydrant replacement- 85,000

Replace the hydrant and isolation valve at the corner of 50st & 48ave, replace the valves (2) at the intersection of 50st & 48ave, replace the valve (1) at the corner of 51st & 48ave, replace the valves (2) on 47a ave.

Stormwater rehab- 40,000

Ditching and culvert replacement along 52st north (WTP RD), ditching along 52st south between 49ave-46ave, ditching and culvert replacement along 47ave from 52st-48st

2023

Valve and hydrant replacement- 85,000

Replace hydrant and isolation valve at 4759 48st, replace valve at 49st & 49ave, replace valves (2) 4719 48st

WTP & Liftstation computer- 40,000

Replace the computers at the WTP and lift station with same or similar as existing, includes reprogramming and bypass to ensure service is not interrupted.

Stormwater Rehab- 25,000

Ditching and culvert replacement as needed on Industrial ave

2024

Sewer line relining- 150,000

Reline gravity sewer mains on 49ave from 49st-53st

2025

Chip Seal LSAT N&S- 200,000

Chip sealing is the application of tar and chips to an existing road surface to extend the life by approx. 7-10yrs.

Sewer line relining- 150,000

Reline the gravity sewer mains on 47ave from 52st-50st

Engineering Ltd.

Draft Report for:

TOWN OF ONOWAY

PAVEMENT ASSESSMENT REPORT 2019

Date: March 07, 2019
Project #: 5449-039-00

Proud of Our Past... Building the Future

www.mpe.ca

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#101, 10630 - 172 Street
Edmonton, AB T5S 1H8
Phone: 780-486-2000
Fax: 780-486-9090

MPE Engineering Ltd.

March 07, 2019

Town of Onoway
P.O. Box 540
481 – 51 Street
Onoway, AB
T0E 1V0

Attention: **Wendy Wildman**
Chief Administrative Officer

Dear Wendy:

Re: **Pavement Assessment Report 2019 - Draft**

MPE Engineering Ltd. is pleased to submit one (1) electronic and one (1) hard copy of our Report entitled *Pavement Assessment Report 2019.*

Should you have any questions, or require clarification on any item, please do not hesitate to contact the undersigned at 780-722-7881 or at pwoelfle@mpe.ca.

Yours truly,

MPE ENGINEERING LTD.

Paul Woelfle
Project Manager

PW:lp

Enclosure

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EXECUTIVE SUMMARY

The Town of Onoway (Town) is responsible for the administration of a paved roadway network consisting of Town roadways totalling approximately 22 lane-kilometres. These networks form valuable assets to be managed in a cost-effective manner in order to provide a desirable level of service to the stakeholders of the network.

In 2018, the Town retained the services of MPE Engineering Ltd. (MPE) to undertake a comprehensive pavement evaluation program. Pavement roughness and surface distress were collected on the entire paved road network, totalling 22 lane-kilometres. In addition, structural and pavement layer testing was conducted on 16 lane-kilometres of the network. The breakdown of the current data collection and reporting program is as follows:

- Collection of pavement roughness and surface distress data on the entire paved roadway network.
- Collection of pavement structural deflection data using a Falling Weight Deflectometer (FWD).
- Implementation of the RUBIX rMD asset management dashboard to facilitate the pavement assessment and the ongoing asset management of the roadway network and other infrastructure assets.
- Preparation of the roadway and sidewalk evaluation report including the network present status and the development of a 10-year roadway rehabilitation needs priority program.

PERFORMANCE INDICATORS

Performance indicators serve to describe the present status or current condition of the pavement and sidewalk networks. The present status of the network serves as the "benchmark" for the future maintenance and rehabilitation requirements of the roadway network. The performance indicators summarized for the analysis are presented herein.

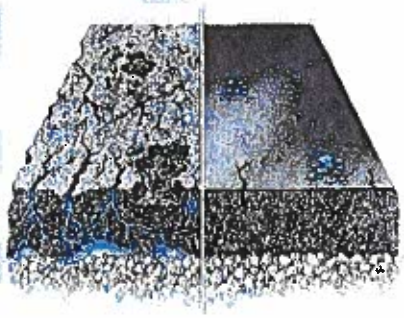
The data collected during the pavement surveys was used to identify the present status of the pavements in terms of four (4) performance indicators:

- **Ride Comfort Index (RCI)** – Index representing measured roughness for the perceived riding comfort experienced by the users of a pavement segment, and represented by a value on a scale of zero (0) to 100, where zero is considered an extremely rough surface and 100 is an extremely smooth surface.
- **Pavement Condition Index (PCI)** – Index representing the presence, severity and extent of various surface distresses (e.g., cracking, potholes, etc.) occurring throughout a given pavement segment, and

represented by a value on a scale of zero (0) to 100, where zero is considered an extremely distressed surface and 100 is surface with no distress present.

- **Structural Adequacy Index (SAI)** – Index representing the ability of a pavement section to support expected loading (traffic) conditions and is indicative of pavement strength, and represented by a value on a scale of zero (0) to 100, where 50 is a pivot point that indicates the pavement's structure is just adequate to support the expected traffic loads. An index less than 50 represents inadequate structural support and greater than 50 represents adequate structural support.
- **Overall Condition Index (OCI)** – Index representing the overall condition of a pavement segment, and represented by a value on a scale of zero (0) to 100, where zero is considered the worst case and 100 is considered the best case. The value is calculated as a function of the RCI, PCI and Structural Adequacy Index (SAI), when available.

Over time, weathering, traffic loading and aging causes pavement quality to deteriorate. Maintenance and/or rehabilitation options applied at the appropriate time can renew and extend the life of a road network. The objective of pavement management is to maximize the present and future value and level of service of the road network by cost-effective management of available public capital funds.



The minimum acceptable OCI values, or rehabilitation trigger levels, for each functional class are set as follows:

- OCI min. of 45 for the Town Road network

For the purpose of this report, the first year (Base Year) of the pavement analysis was set to 2019.

2019 PAVED ROAD NETWORK CONDITION

The results of the 2019 pavement present status analysis are provided in **Table ES.1.**

Table ES.1: 2019 Pavement Network Present Status

FUNCTIONAL CLASS	SEGMENTS	LANE-KM	OCI	PCI	RCI	SAI	IRI (m/km)
Town Road Network	66	22.0	58	64	44	54*	4.61

**SAI scores for 16.0 lane-kilometres (73%) of the paved road network.*

The analysis of the collected condition data indicates the majority of the Town's network is providing a fair level of service given the network average OCI is 58 and the 2019 needs backlog is 30.1%. The backlog is becoming unmanageable being above the recommended range of 10%–25%, traditionally considered a healthy backlog.

The results show the Town's paved roadway network is showing some distress-related deterioration, with a network average PCI of 64. The results show that the Load related defects, particularly the roughness (RCI) and the strength (SAI) are the main 'drivers' of the deterioration in the Town's roadway network. A contributing factor to the load related deterioration is that over half of the roadway network is classified as having thin pavement structures leading to more rapid deterioration.

The roughness condition of the network is in the lower marginal range with a network average RCI of 44.

The average SAI of 54 indicates the Town roadways, as a network, are just structurally adequate to carry the predicted traffic loading. The FWD results show the average SN_{eff} is 78 mm of AC, which indicates the effective asphalt thicknesses is close to, but thinner than, the estimated layer thicknesses. The average M_R of 41,877 kPa indicates adequate subgrade conditions across the network on average.

The results of the 2019 backlog analysis are provided in **Table ES.2.**

Table ES.2: 2019 Paved Road Network Backlog Status

FUNCTIONAL CLASS	2019 NETWORK NEEDS (% LANE-LENGTH)	2019 NETWORK NEEDS (LANE-KM)
Town Road Network	**30.1**	**6.6**

The results of the rehabilitation needs analysis show the Town has a higher than recommended rehabilitation backlog. Further, the prediction results indicate a surge in the rehabilitation needs in 2023 and 2024. It is recommended that the Town make fiscal preparations to address the current level of backlog in the network prior to the predicted surge.

ROAD NETWORK BUDGET PROGRAMMING

The rMD budget optimization analysis generates prioritized work programs that are the most cost effective based on annual budget constraints or target performance levels. For the purpose of this report, the analysis was run over a 10-year programming period, **with the first year of the programming set to 2019**.

The results of the budget programming analysis are provided in **Table ES.3**.

Table ES.3: 10-Year Budget Analysis Summary

BUDGET ID	BUDGET SCENARIO	10-YEAR BUDGET	2019		10-YEAR (2028)	
			OCI	%DEF	OCI	%DEF
Do Nothing	No Funding	$0	50	30.1	36	78.4
Need Driven	Unconstrained	$2.3M	76	0.0	72	0.0
$150K/Year	Annual Fixed Budget	$1.46M	53	0.0	68	23.4
$175K/Year	Annual Fixed Budget	$1.72M	53	0.0	70	13.0

The results of the rehabilitation needs and priority programming analysis show that the roadway network will require approximately $2.3M over the next 10 years. This will result in a predicted network OCI of 72 and 0.0% backlog in 2028. The "Do Nothing" scenario shows the network will deteriorate to a predicted OCI of 36, with a backlog of 78.4% in 2028.

The results of the first annual funding scenario ($150K/Year) show that the network performance will improve from an OCI of 53 to 68 in 2028, with a backlog of 23.4%. This scenario shows a funding level that will reduce the backlog of the road network towards the high-end of the recommended range by 2028, with a total 10-Year funding allocation that is 64% of the predicted total rehabilitation Needs costs.

The results of the second annual funding scenario ($175K/Year) show that the network performance will improve from an OCI of 53 to 70 in 2028, with a backlog of 13.0%. This scenario shows a funding level that will reduce the backlog of the road network towards the low-end of the recommended range by 2028, with a total 10-Year funding allocation that is 75% of the predicted total rehabilitation Needs costs.

Due to the current higher level of backlog in the network, $1.1M (46%) of the needs budget allocations are required in the first year of the program (2019).

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1.0 PROJECT OVERVIEW

1.1 Background

The Town of Onoway (Town) is responsible for the administration of a paved roadway network consisting of Town roadways totalling approximately 22 lane-kilometres. These networks form valuable assets to be managed in a cost-effective manner in order to provide a desirable level of service to the stakeholders of the network.

1.2 Scope and Objectives

In 2018, the Town retained the services of MPE Engineering Ltd. (MPE) to undertake a comprehensive pavement evaluation program. Pavement roughness and surface distress was collected on the entire paved road network, totalling 22 lane-kilometres. In addition, structural and pavement layer testing was conducted on 16 lane-kilometres of the network. The breakdown of the current data collection and reporting program are as follows:

- Collection of pavement roughness and surface distress data on the entire paved roadway network.
- Collection of pavement structural deflection data using a Falling Weight Deflectometer (FWD).
- Implementation of the RUBIX rMD asset management dashboard to facilitate the pavement assessment and the ongoing asset management of the roadway network and other infrastructure assets.
- Preparation of the roadway and sidewalk evaluation report including the network present status and the development of a 10-year roadway rehabilitation needs priority program.

The 2018 field survey consisted of the following:

- An automated roughness survey using MPE's data collection vehicle (22.0 lane-kilometres).
- A semi-automated surface distress survey using MPE's data Collection vehicle (22.0 lane-kilometres).
- Falling Weight Deflectometer (FWD) testing (132 Test locations).

The data collected during the pavement surveys was used to identify the present status of the pavements in terms of four (4) performance indicators:

- Ride Comfort Index (RCI)
- Pavement Condition Index (PCI)
- Structural Adequacy Index (SAI)
- Overall Condition Index (OCI)

Over time, weathering, traffic loading and aging cause pavement quality and adjacent facilities (sidewalks and curbs) to deteriorate. Maintenance and/or rehabilitation options applied at the appropriate time can renew and extend the life of these municipal networks. The objective of pavement management is to maximize the present and future value and level of service of the road network by cost-effective management of available public capital funds.

An effective pavement management system should have the following qualities:

- **Method** of data collection that is uniform, consistent and repeatable.
- **Logical** and functional database.
- **Objective** method of present status calculation and reporting.
- **User-definable** methodology of needs analysis to develop rehabilitation strategies.
- **Analytical** engine for optimization of network rehabilitation, following a user-definable set of goals.

The Town has opted to utilize the RUBIX rMD asset application provided by MPE and developed by Rival Solutions Inc. The RUBIX platform will provide the basis for the 2019 pavement evaluation programming and will enable the Town to update the pavement management program moving forward.

Figure 1.1 on the following page shows the 2018 survey coverage.

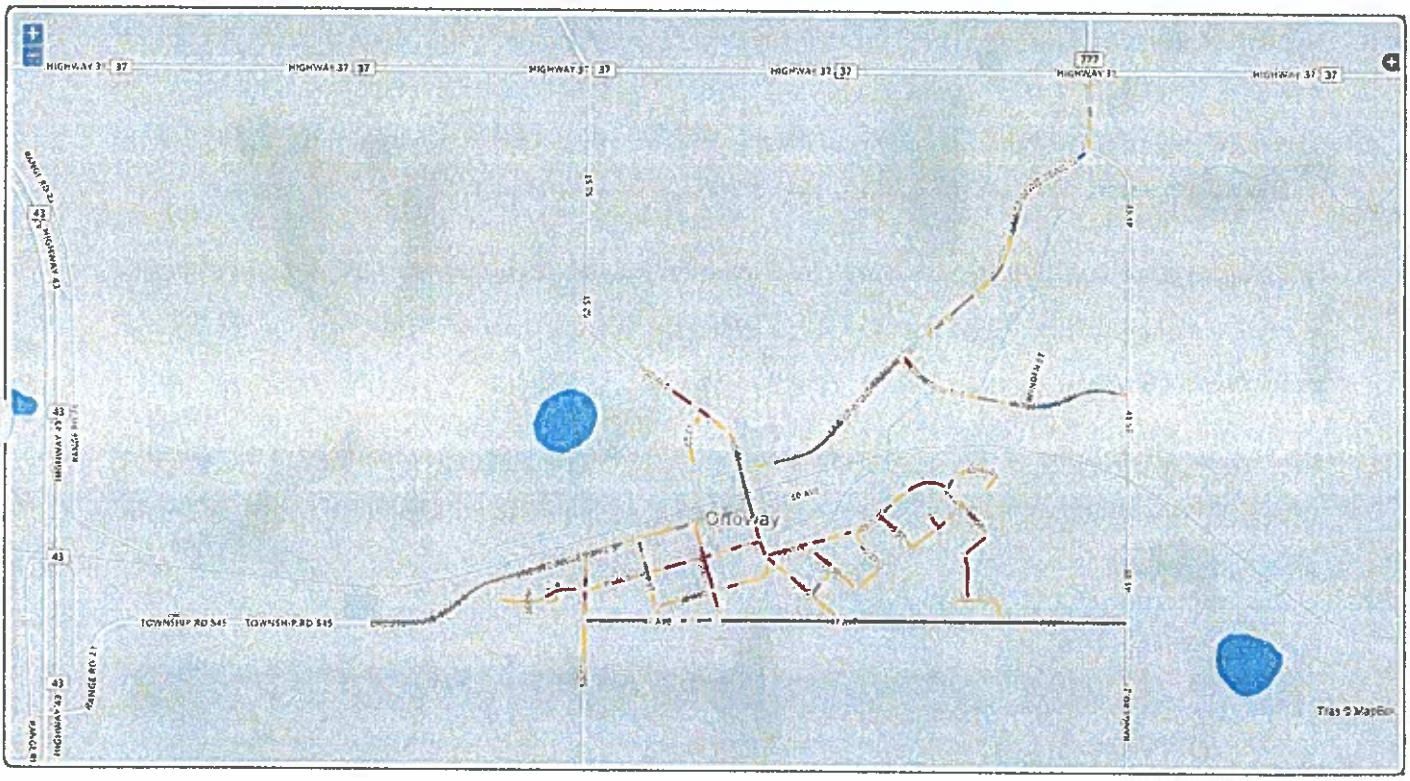

Figure 1.1: Pavement Survey Coverage – 2018

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2.0 PAVEMENT DATA COLLECTION

2.1 Network Definition and Attribute Data

The 2019 network definition and attribute data setup consisted of the following:

- Define the Town's roadway network based on the existing GIS road centreline file. Roadway segments are identified using unique Asset IDs stored in the GIS database.
- Activate and load the RUBIX asset management framework.
- Classify network attributes used for analysis (traffic, structure, geometrics, etc.).

The roadway network definition used for the purpose of the 2019 report is based on the Town's current GIS road centreline file, created by MPE. The network definition maintains a direct link to the Town's Asset ID convention established for the network in the GIS database provided by MPE. Slight modifications were made to the network definition based on actual conditions encountered during the field surveys.

During discussions with the Town, it was determined that network traffic information was not readily available. Because of this discussion, the 2019 traffic levels were established based on a default trip generation method.

The pavement structure attributes for the pavement layer thicknesses were derived from the FWD analysis results. **Table 2.1** and **Table 2.2** show the default attribute values used for the 2019 pavement condition analysis.

Table 2.1: Traffic Attributes

FUNCTIONAL CLASS	AADT (AVG)	AADT METHOD
Collector Roads	122	0.5 x CL-Length
Local Roads	35	0.25 x CL-Length

Table 2.2: Pavement Structure Default Attributes

FUNCTIONAL CLASS	EGT (mm)	ASPHALT (mm)	GRANULAR (mm)	BASE (mm)
Collector Roads*	460	90	175	150*
Local Roads	365	80	100	150*

**Note: the pavement structure thickness were estimated from the FWD analysis. MPE applied an assumed base layer thickness, which is required for the analysis.*

No additional structural information was available for the project. The subgrade Strength condition for the network segments was set based on the calculated FWD Resilience Modulus (M_R), for the purpose of the analysis and reporting.

2.2 2018 Field Survey

The roughness of each segment was measured using MPE's data collection vehicle. The data collection vehicle is a Class I Profiler, specially equipped with accelerometers and laser sensors mounted to the front bumper. This technology was used to measure the longitudinal profile of the pavement surface in each wheel path of the survey travel lane. The profile data was then used to calculate an International Roughness Index (IRI) reported at 30-metre intervals (stations).

The surface distress survey recorded the extent and severities of key distress classifications including load associated cracking, non-load associated cracking, surface deformations and surface defects. The following 12 distress types were inventoried:

Distress Types for Flexible Pavements	
Patching and Utility Patching	Edge Cracking
Rippling/Shoving	Alligator Cracking
Raveling/Weathering	Potholes
Bleeding	Block/Map Cracking
Distortions/Deformations	Longitudinal Cracking
Rutting	Transverse Cracking

MPE's Pavement Profiler is fitted with two forward-facing camera configuration and the Trimble T3D Cam Capture video acquisition system, allowing MPE to collect continuous digital images at a predefined interval (time or distance based). The geo-spatial digital images provide MPE with the ability to conduct thorough quality checks of the pavement inspections collected in the field. All pavement data collected using the automated onboard system is identified with GPS coordinates.

Deflection measurements, taken to determine the load-bearing capacity of the existing pavement structures, were collected with a FWD test vehicle. The survey was conducted with the FWD located in the outer wheel path of the outside lane at each test location. The deflection measurements were taken on an average of one deflection test every 100 m, or three tests on a section. The deflection

measurements are used, along with traffic and pavement structure information to determine the Structural Adequacy Index (SAI) for each road section.

The following images show MPE's mobile road testing equipment and WCRT's FWD/GPR equipment used for the pavement data collection.

MPE Engineering Ltd. Data Collection Vehicle (Class I Profiler)

West Coast Road Testing FWD and GPR

3.0 PAVEMENT DATA ANALYSIS

As part of the project workflow, MPE implemented the RUBIX Management Dashboard (rMD) solution to enable the 2019 evaluation and the future management of the roadway network. The RUBIX asset management solution is a lightweight, user-definable, cloud-based application that enables the user to collect, analyze, monitor and report on the performance of various infrastructure assets, including pavements. The RUBIX platform supports multiple data collection and analysis methodologies, including Paver (ASTM D6433). MPE utilized the rMD application as the primary analysis and database platform for the pavement evaluation analysis and reporting.

The roadway pavement condition data is summarized into the following key performance indicators:

- **Pavement Condition Index (PCI)** - based on the surface distress inventory.
- **Ride Comfort Index (RCI)** - based on the longitudinal profile data.
- **Structural Adequacy Index (SAI)** - analyzed from the FWD, Layer and Traffic data.
- **Overall Condition Index (OCI)** - as a function of the PCI, RCI, and SAI conditions.

The pavement condition results provide the Present Status, or current condition, of the roadway network. The condition of the network is summarized, and provided to the Town, by the entire network, and broken down by the major functional classes defined in the GIS database.

Rehabilitation triggering levels are established for each functional classification in the network based on the OCI. They determine the condition threshold at which a roadway segment is considered to be in need of rehabilitation. The rehabilitation trigger levels are typically set higher for the upper functional class networks (Arterials and Collectors), reflecting the increased importance of these traffic corridors.

Pavement deterioration curves are used to predict the future performance of the OCI score for a given segment. The rMD application defines six deterioration models based on pavement classifications built around traffic volume, structure thickness, and subgrade strength levels. The results indicate the Need Year in which a given segment will require treatment and provide the current needs, or backlog, as well as the predicted future needs of the roadway network.

The rMD application utilizes a decision matrix methodology to determine the recommended treatment level based on the performance characteristics of the pavement segment.

The decision matrix methodology is designed around the fundamentals of pavement management and the four main drivers of pavement deterioration. Performance condition results from the analysis of the field data are further analyzed to produce condition levels for these four main causes of **Load, Environment, Construction, and Material**.

The appropriate rehabilitation treatment option is defined in the matrix at the various levels of these 'cause-condition' combinations. A decision matrix will be built for each functional class, as treatment options and constraints do vary between lower and higher-volume roadways.

The final stage of the workflow is the Budget Optimization Analysis. During this step of the analysis, several 10-year budget scenarios will be applied to the rehabilitation needs results. MPE will provide the Town with four (4) budget scenarios. These scenarios show the annual cost to do all of the recommended work (Needs Budget), and the impact on the network level of service if no work is done (Do Nothing scenario). Additionally two annual budgets were analyzed to show the effect of two different levels of funding. Each budget scenario shows the 10-year predicted network OCI performance and resulting backlog for comparison.

3.1 Roughness – Ride Comfort Index (RCI) Analysis

One of the primary operating characteristics of a road, from the user's perspective, is the roughness, which represents the travelling public's opinion of the smoothness and, hence, the quality of service provided by a pavement. The data collection vehicle measures the longitudinal profile of the pavement surface, reported as an International Roughness Index (IRI) value. Roughness measurements are correlated to an assessment of ride quality as perceived by the users of the pavements. This subjective assessment is termed the RCI.

The RCI condition score for each road segment ranges from zero (0) to 100, where 100 is indicative of an extremely smooth pavement and an index of zero (0) is indicative of an extremely rough pavement. When pavements are rehabilitated with an overlay or heavier treatment, an override RCI value of 80 (IRI = 1.25 m/km) is applied. The detailed RCI methodology is provided in ***Appendix A***.

3.2 Surface Distress – Pavement Condition Index (PCI) Analysis

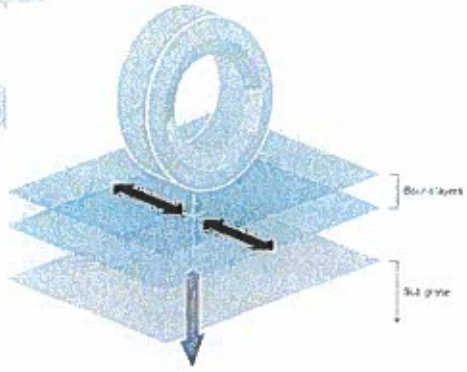
The PCI is a measure of physical pavement cracking, deformations and surface defects collectively referred to as distresses. The surface distress survey provided an inventory of the severity and extent for 12 surface distress types in each station of every segment in the network (i.e., 30-metre intervals).

These distress ratings were analyzed to produce %Area quantities, at each severity level, which were further combined using distress-specific weighting factors to generate an overall PCI for each station. A summary PCI score was then computed based on the aggregated station PCI scores for each GIS segment.

The PCI condition score for each road segment ranges from zero (0) to 100, where 100 indicates a perfect (no distress) surface and an index of zero (0) indicates a significant level of surface distress. When pavements are rehabilitated with an overlay or heavier treatment, an override PCI value of 100 is applied. The detailed PCI methodology is provided in ***Appendix B***.

3.3 Strength – Structural Adequacy Index (SAI) Analysis

The structural adequacy of a pavement indicates the pavement's ability to carry expected traffic loads while providing an acceptable level of service. The structural capacity of a pavement is determined by analyzing the measured deflection of the pavement under a controlled loading condition, in combination with the design ESAL loads calculated from the traffic AADT and %Trucks data.



The FWD deflection measurements are adjusted for temperature and seasonal influences and normalized to 4,082 kg (9,000 lb) loads. Seasonally adjusted deflection measurements were analyzed along with the traffic and layer data, to determine SAI values for each section. The SAI values were then loaded to the rMD database.

The SAI is represented by a value on a scale of zero (0) to 100, where a value of 50 represents a structural strength that just adequately supports the current traffic loads, a value less than 50 represents inadequate structural support, and a value greater than 50 represents more-than-adequate structural support. The detailed SAI methodology is provided in ***Appendix C***.

3.4 Combined – Overall Condition Index (OCI) Analysis

The OCI provides an overall indication of the pavement condition with regard to present and future service to the user and is derived through a combination of the segment RCI and PCI values.

The available methods used to calculate OCI are as follows:

For roadways without structural condition data:

OCI = f(RCI, PCI)

For roadways with structural condition data:

OCI = f(RCI, PCI, SAI)

For roadways with surface distress data only (e.g. parking lots):

OCI = f(PCI)

As is the case with RCI, PCI, and SAI, the OCI ranges from zero (0) to 100, where zero (0) represents the worst condition of a pavement and 100 represents the best condition of a pavement. The detailed OCI methodology is provided in ***Appendix D***.

3.5 Performance Prediction

The OCI values of pavements typically decrease over time. In order to estimate future rehabilitation requirements of a pavement network, it is necessary to model the deterioration of OCI values. The rate of deterioration of OCI depends on several factors, but it can be demonstrated the principal factors are the traffic loading conditions, the properties and thickness of the pavement structure layers, and the strength of the underlying subgrade.

The factors used to model pavement performance within the rMD application are as follows:

- Equivalent granular thickness (EGT) in three levels (thin, medium, thick).
- Traffic volume or average annual daily traffic (AADT) in three levels (low, medium, high).
- Subgrade strength in two levels (strong/adequate, weak/inadequate).

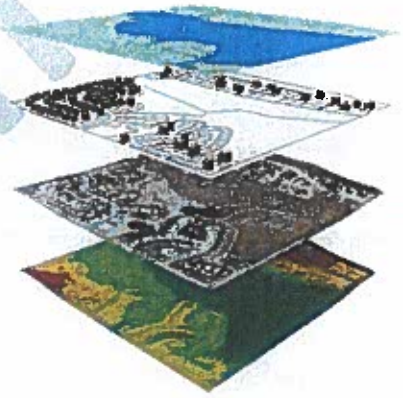
The analysis of the FWD data provided rough estimates of the thicknesses of the bound (AC) and granular (GBC) layers. The rMD analysis is setup to utilize three (3) standard pavement layers, so MPE set the Base layer thickness at 150 mm. The EGT values were calculated from the layer thicknesses for each network segment. The criteria used to classify traffic (AADT) and structural (EGT) threshold levels are shown in **Table 3.1**.

Table 3.1: Structure Thickness and Traffic Classification Limits

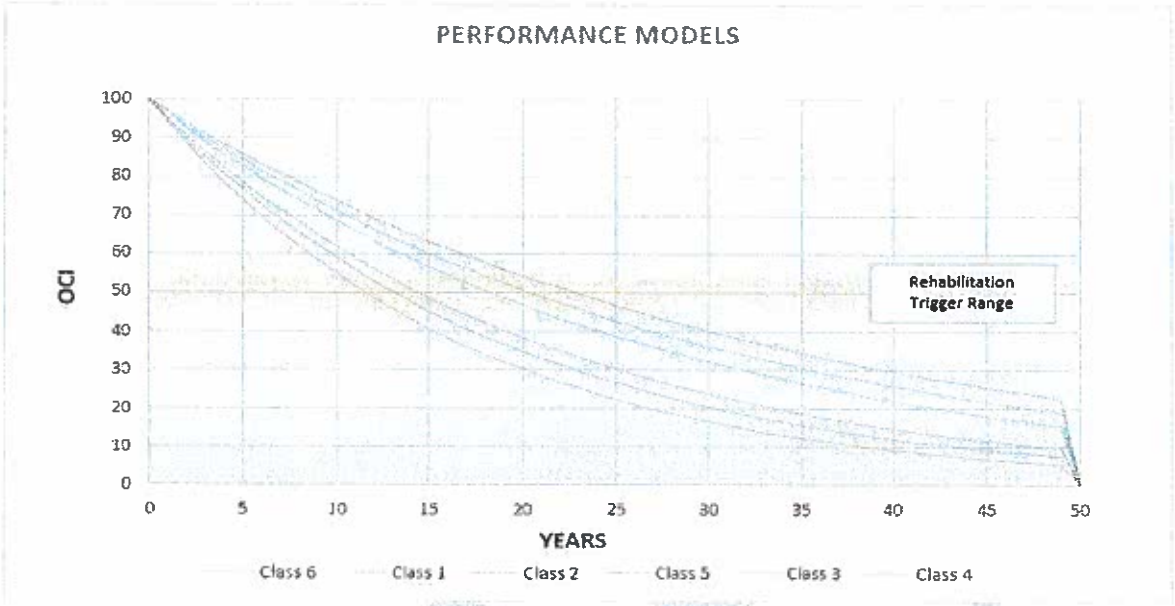
FUNCTIONAL CLASS	THICKNESS LEVEL (EGT mm) THIN ≤ MED < THICK	TRAFFIC LEVEL (AADT) LOW ≤ MED <HIGH
Entire Network	399 ≤ Medium < 700	199 ≤ Medium < 1500

For the purpose of the analysis, the results of the FWD analysis were used to identify weaker subgrade conditions. Based on a review of the Subgrade Modulus (M_R), a threshold of 34,000 kPa (4,931 PSI) or lower was set to identify pavements with 'weak' subgrade strengths. The analysis results showed that some of the roadway segments selected for testing fell below that threshold.

The combination of the three classification parameters—pavement structure thickness, traffic loading and subgrade strength—result in 6 possible performance classes of pavements, and each roadway segment in the network is assigned an individual performance curve based on its performance classification. The performance curves plot the deterioration of the OCI over time, and the difference between the curves is based on variations in levels of the pavement thickness, traffic and subgrade strength.



The OCI performance deterioration models used for the Town are shown in **Figure 3.1**.



		EGT					
		Thin		Med		Thick	
		Subgrade					
		Weak	Strong	Weak	Strong	Weak	Strong
Traffic	Low	3	3	4	5	5	6
	Med	2	2	3	4	5	6
	High	1	2	2	3	4	6

Figure 3.1: OCI Deterioration Models

The OCI performance curves used in the analysis were established based on the historical performance of other municipal networks in Alberta.

Based on the analysis parameters setup, most the Town's roadway network is classified as having Low traffic, a mix of Thin and Medium pavement thickness, and generally Strong subgrade conditions. The majority of the network is deteriorating using the Class 4 and Class 5 models.

3.6 Priority Programming Analysis

3.6.1 Need Year Analysis

The Needs analysis is the identification of pavement segments that are deficient with regard to some specified criterion or criteria. When a given pavement segment deteriorates to or is below its OCI trigger level, it is considered a Need candidate. For a paved road network, segments that are currently deficient are referred to as *present needs*; segments that are deficient in the future years are referred to as *future needs*.

A Need Year Distribution graphically illustrates the annual network rehabilitation needs for segments that fall below a given level of service (i.e., OCI) and should be rehabilitated. The Need Year analysis assumes an unrestricted budget for rehabilitation.

For this analysis, the minimum acceptable OCI (OCI_{min}) is the threshold level of service used to determine if any rehabilitation should take place. The minimum acceptable OCI for each functional classification within the rMD is shown in **Table 3.2**.

Table 3.2: Minimum OCI Thresholds

FUNCTIONAL CLASS	LANE-LENGTH (KM)	MINIMUM OCI
Town Road Network	21.975	45

3.6.2 Rehabilitation Decision Matrix

Once a Need Year has been calculated for a pavement segment, any potential rehabilitation strategies that may be applied to the pavement segment must be determined. In the analysis, a segment that has a deteriorated OCI of less than or equal to the trigger value requires some form of rehabilitation during its Need Year.

The foundation of the decision matrix approach is based around the causes of various distresses as outlined in the Pavement Management Guide (RTAC). The approach is centred on the relationship between Load, Environmental, Construction and Material causes for various pavement distresses.

Using the guidelines provided by the ASTM D6433 PCI Standard, the distress, roughness and structural data collected in the field were classified for three levels of condition (Good, Fair and Poor). The principles of distress causes were then utilized to consolidate and group these performance indicators into condition-matrices for the four main pavement deterioration drivers of Load, Environmental, Construction and Material. The classification matrices for each driver are provided in ***Appendix E***.

Table 3.3 illustrates the relationship between deterioration cause and defect type.

Table 3.3: Defect-Cause Relationship

DEFECT TYPE	LOAD	MATERIAL	ENVIRONMENT	CONSTRUCTION
SURFACE DEFECTS (CLASS 4)		⚠	⚠	⚠
Raveling		✓		✓
Bleeding/Flushing		✓	✓	✓
Potholes		✓	✓	✓
DEFORMATIONS (CLASS 3)	⚠			⚠
Rutting	✓	✓		✓
Rippling	✓	✓		✓
Depressions (Distortion)	✓			✓
Upheaval (Distortion)			✓	
Slippage/Edge Lipping	✓			✓
Excessive Crown	✓			✓
CRACKING (CLASSES 1 & 2)	⚠	⚠	⚠	
Alligator/Fatigue	✓			
Longitudinal/Meandering	✓	✓	✓	
Transverse		✓	✓	
Progressive Edge		✓	✓	
Block/Map	✓	✓	✓	

The final decision-making input is done at the Rehabilitation decision matrix level. At this level, the four main deterioration drivers are grouped in pairs in a cross-relational matrix structure based on common distress types and influence factors. Load and Construction are grouped on one axis, and Environmental and Material on the other.

By applying the available rehabilitation treatments to the appropriate condition levels of the combined deterioration drivers, a reliable program of recommended work can be generated from the pavement condition results using the cause-driven matrix approach. The decision matrices for each functional classifications are provided in ***Appendix F***.

Table 3.4 shows the rehabilitation treatment levels and associated parameters used in the analysis.

Table 3.4: Rehabilitation Alternatives

CODE	TREATMENT OPTIONS	TYPE	COST/LN-KM	OCI BENEFIT
1	Micro Surface/Surface Treat	G. Maintenance	$83,250	25
2	Overlay 50 mm	Rehabilitation	$128,250	50
3	Overlay 75 mm	Rehabilitation	$157,500	60
4	Edge Mill and Overlay 50 mm	Rehabilitation	$146,250	55
5	Full Mill and Overlay 50 mm	Rehabilitation	$171,000	60
6	Full Mill and Overlay 75 mm	Rehabilitation	$207,000	70
7	Full Mill and Overlay + LBR	Rehabilitation	$261,000	80
8	Local Reconstruction	Construction	$675,000	100

3.6.3 Priority Programming and Optimization

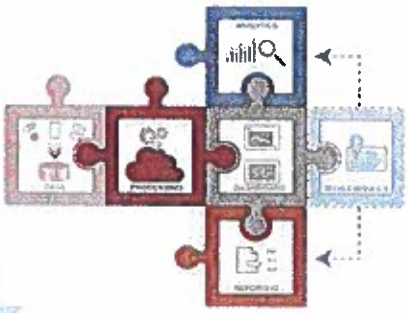
Without the burden of limited funding, pavements would be rehabilitated whenever required. In actual practice, budgetary constraints often determine the timing and implementation of rehabilitation strategies. Using different budget scenarios and/or other constraints, the rehabilitation program analysis assembles an optimized multi-year rehabilitation program, estimates the impact the scenario will have on the overall network performance, and calculates the annual rehabilitation backlog of work that could not be addressed (for scenarios with limited funding). The budget optimization analysis generates prioritized work programs that are the most cost effective based on annual budget constraints. For the purpose of this report, the analysis was run over a 10-year programming period, **with the first year of the programming set to 2019.**

The network programming analysis was run using the following funding scenarios:

- Do Nothing Budget (no funding)
- Need Driven Budget (unlimited funding)
- Fixed Annual Budget: $150K/Year – reduces network backlog towards the high-end (25%) of the recommended range.
- Fixed Annual Budget: $175K/Year – reduces network backlog towards the low-end (10%) of the recommended range.

4.0 PAVEMENT ANALYSIS RESULTS

The following section discusses and summarizes the condition of the Town's Entire Paved Roadway Network. This section provides the summary performance indicators distribution graphs for the Entire Paved Network, consisting of 16 lane-kilometres. The Need Year summary is also provided for the Town's Entire Paved Network, showing the distribution of the rehabilitation needs through the 10-year programming period.



The complete present status and rehabilitation recommendation listing, by network segment, is provided in ***Appendix G***.

The 2019 present status of the Town roadway network is summarized in **Table 4.1**.

Table 4.1: 2019 Network Performance Summary

FUNCTIONAL CLASS	SEGMENTS	LANE-KM	OCI	PCI	RCI	SAI	IRI (m/km)
Town Road Network	**66**	**22.0**	**58**	**64**	**44**	**54**	**4.61**

The Cause-Condition levels for the Town roadway network are summarized by lane-kilometres, in **Table 4.2,** and graphically on the following page in **Figure 4.1.**

Table 4.2: 2019 Cause-Condition Summary

CONDITION LEVEL	LOAD	ENVIRONMENT	MATERIAL	CONSTRUCTION
Good	6.364	17.464	21.686	21.064
Fair	7.506	4.511	0.188	0.813
Poor	8.105	0.0	0.098	0.098

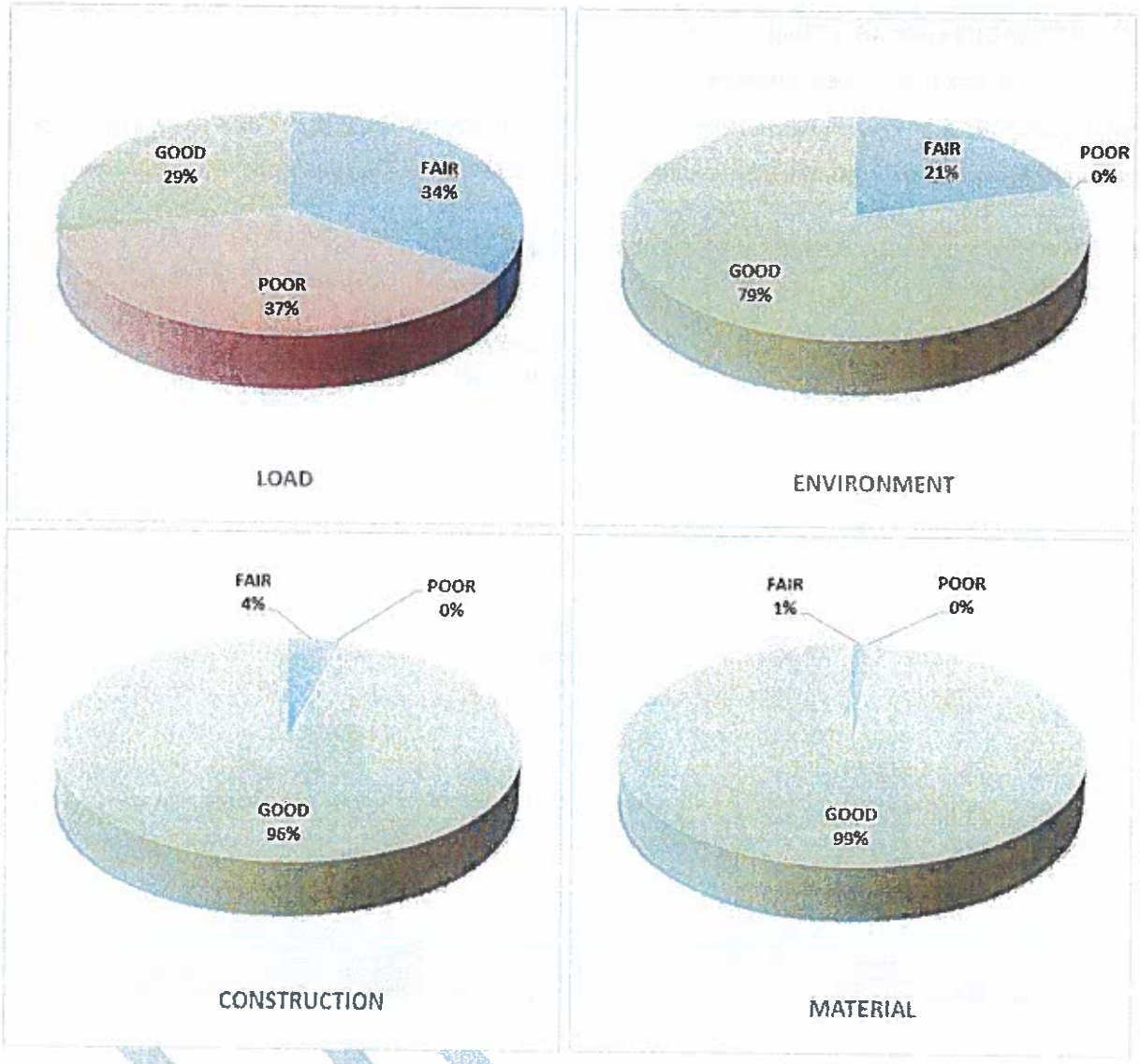


Figure 4.1: Network Cause-Condition Distribution

The results show that the Load related defects are the main 'drivers' of the deterioration in the Town's roadway network. In the case of Onoway the key Load drives are the roughness (RCI) and structural strength (SAI) conditions.

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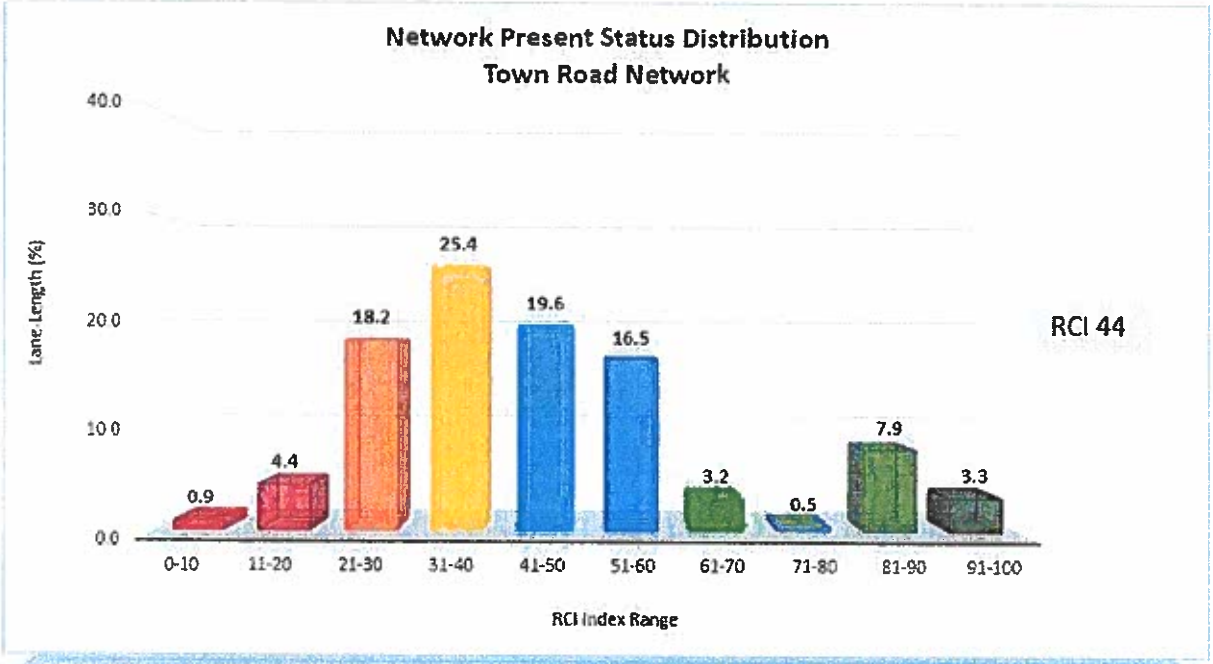
4.1 Present Status Analysis Results – Entire Paved Network

4.1.1 Roughness (RCI) Analysis Results

The results indicate a large portion of the roadway network is exhibiting signs of poor to marginal ride quality. **Figure 4.2** shows the distribution of RCI values, weighted by lane-kilometres.

The plot indicates a mean RCI of 44 for the Entire Paved Network.



	RCI INDEX RANGE										
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL
LL %	0.9	4.4	18.2	25.4	19.6	16.5	3.2	0.5	7.9	3.3	100.0
LL km	0.2	1.0	4.0	5.6	4.3	3.6	0.7	0.1	1.7	0.7	22.0

Figure 4.2: RCI Distribution – Town Road Network

Table 4.3 shows the distribution of the network between poor, marginal and acceptable RCI values.

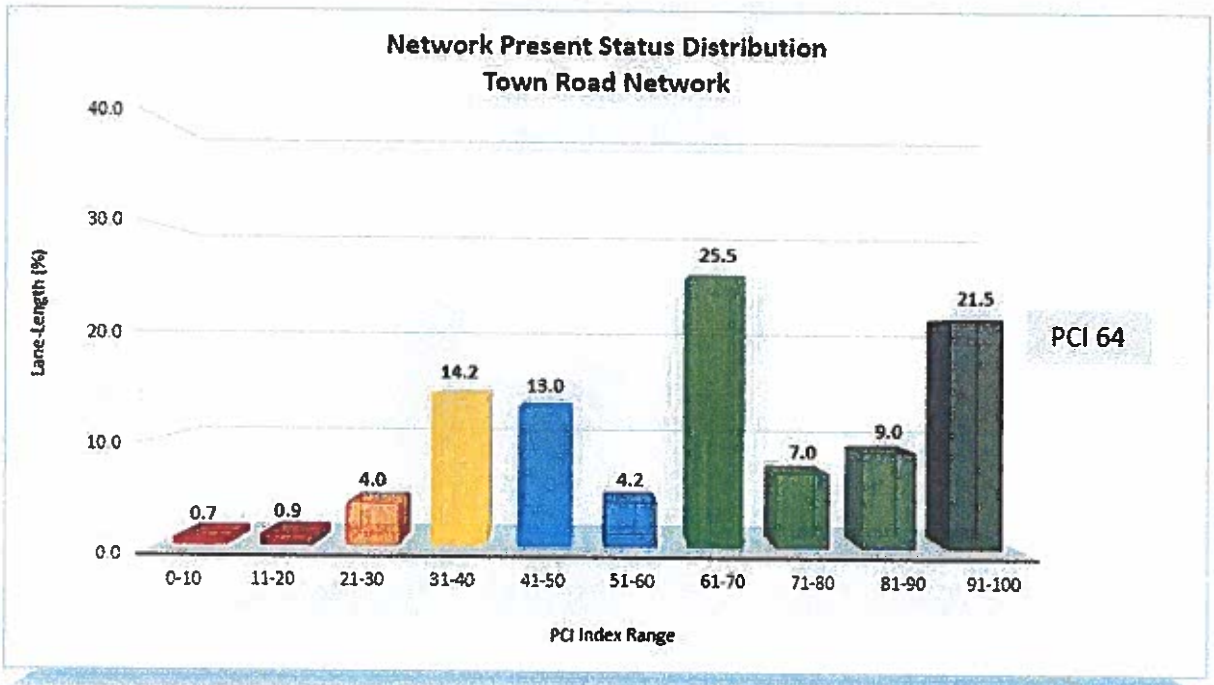
Table 4.3: RCI Distribution – Town Road Network

RCI RANGE	RIDE CONDITION	LANE-KM	% OF NETWORK
RCI ≤ 40	Poor	10.8	48.9
40 < RCI ≤ 60	Marginal	7.9	36.2
RCI > 60	Acceptable	3.3	14.9

4.1.2 Pavement Distress (PCI) Analysis Results

The results show the network is exhibiting good to marginal performance, with respect to the pavement distress. **Figure 4.3** shows the distribution of PCI values, weighted by lane-kilometres.

The plot indicates a mean PCI of 64 for the Entire Paved Network.



PCI INDEX RANGE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL
LL %	0.7	0.9	4.0	14.2	13.0	4.2	25.5	7.0	9.0	21.5	100.0
LL km	0.1	0.2	0.9	3.1	2.9	0.9	5.6	1.5	2.0	4.7	22.0

Figure 4.3: PCI Distribution – Town Road Network

Table 4.4 shows the distribution of the network between poor, marginal and acceptable PCI values.

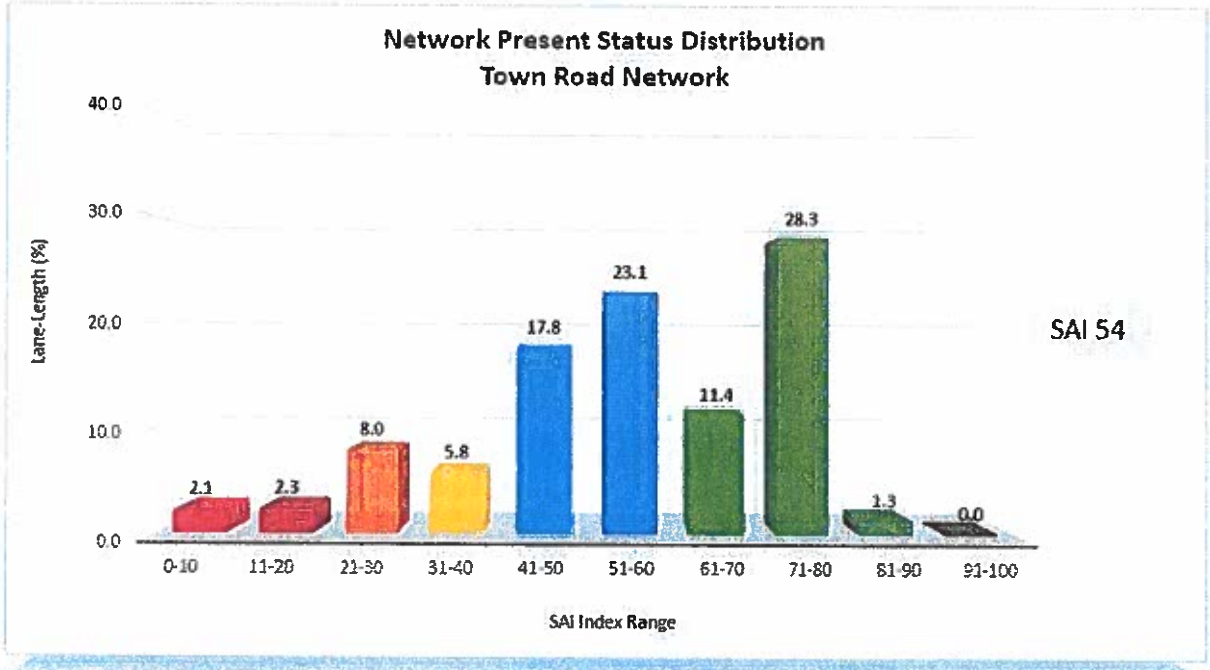
Table 4.4: PCI Distribution – Town Road Network

PCI RANGE	DISTRESS CONDITION	LANE-KM	% OF NETWORK
PCI ≤ 40	Poor	4.4	19.8
40 < PCI ≤ 60	Marginal	3.8	17.2
PCI > 60	Acceptable	13.8	63.0

4.1.3 Structural Adequacy (SAI) Analysis Results

These results indicate half of the network surveyed for SAI is just structurally adequate to support the expected traffic loading over the 10-year programming period. **Figure 4.4** shows the distribution of SAI values, weighted by lane-kilometres.

The plot indicates a mean SAI of 54 for the Entire Paved Network.



	SAI INDEX RANGE										
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL
LL %	2.1	2.3	8.0	5.8	17.8	23.1	11.4	28.3	1.3	0.0	100.0
LL km	0.3	0.4	1.3	0.9	2.9	3.7	1.8	4.5	0.2	0.0	16.0

Figure 4.4: SAI Distribution – Town Road Network (with SAI)

Table 4.5 shows the distribution of the network between inadequate and adequate SAI values.

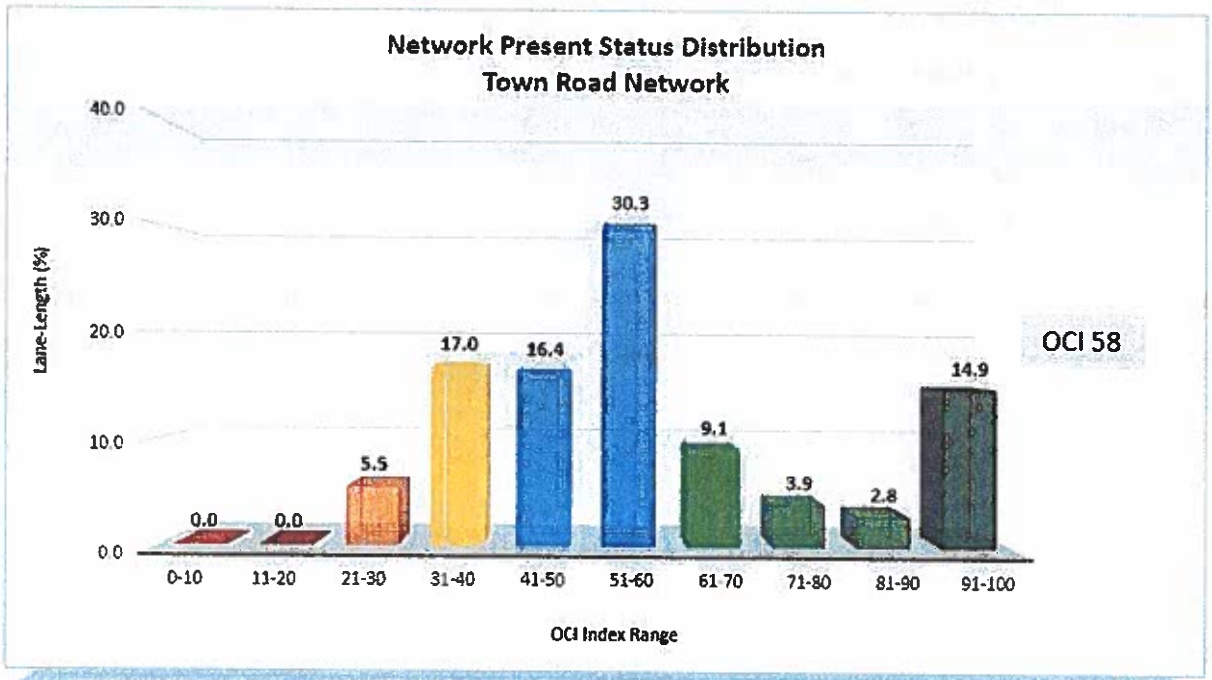
Table 4.5: SAI Distribution - Entire Paved Network (with SAI)

SAI RANGE	STRUCTURAL CONDITION	LANE-KM	% OF NETWORK
SAI ≤ 50	Inadequate	5.8	36.0
SAI > 50	Adequate	10.2	64.0

4.1.4 Overall Condition (OCI) Analysis Results

The results indicate a large portion of the roadway network is exhibiting signs of fair performance, with the roughness and structural conditions showing the most deterioration. **Figure 4.5** shows the distribution of OCI values, weighted by lane-kilometres.

The plot indicates a mean OCI of 58 for the Entire Paved Network.



	OCI INDEX RANGE										
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL
LL %	0.0	0.0	5.5	17.0	16.4	30.3	9.1	3.9	2.8	14.9	100.0
LL km	0.0	0.0	1.2	3.7	3.6	6.7	2.0	0.9	0.6	3.3	22.0

Figure 4.5: OCI Distribution – Town Road Network

Table 4.6 shows the distribution of the network between in-need and acceptable OCI values.

Table 4.6: OCI Distribution – Town Road Network

OCI RANGE	OVERALL CONDITION	LANE-KM	% OF NETWORK
OCI ≤ Trigger[1]	In-Need	6.6	30.1
OCI > Trigger[1]	Acceptable	15.4	69.9

[1] *Trigger level set for the network is OCI = 45.*

4.2 Rehabilitation Needs Analysis Results

The Need Year of a pavement is defined as the year in which the OCI of the pavement falls to, or below a critical value, known as the OCI Trigger Level. For the purpose of this report, the Base Year of the analysis was set to 2019.

Table 4.7 shows the current rehabilitation needs summary by functional class and for the Town's entire paved roadway network.

Table 4.7: 10-Year Network Needs Summary

FUNCTIONAL CLASS	2019 NETWORK NEEDS (% LANE-LENGTH)	2019 NETWORK NEEDS (LANE-KM)
Town Road Network	**30.1**	**6.6**

The summary of the accumulating 10-year program Needs (non-funded scenario), is reported in %Lane-Length for each functional classes and the entire network, and are shown in **Figure 4.5**.

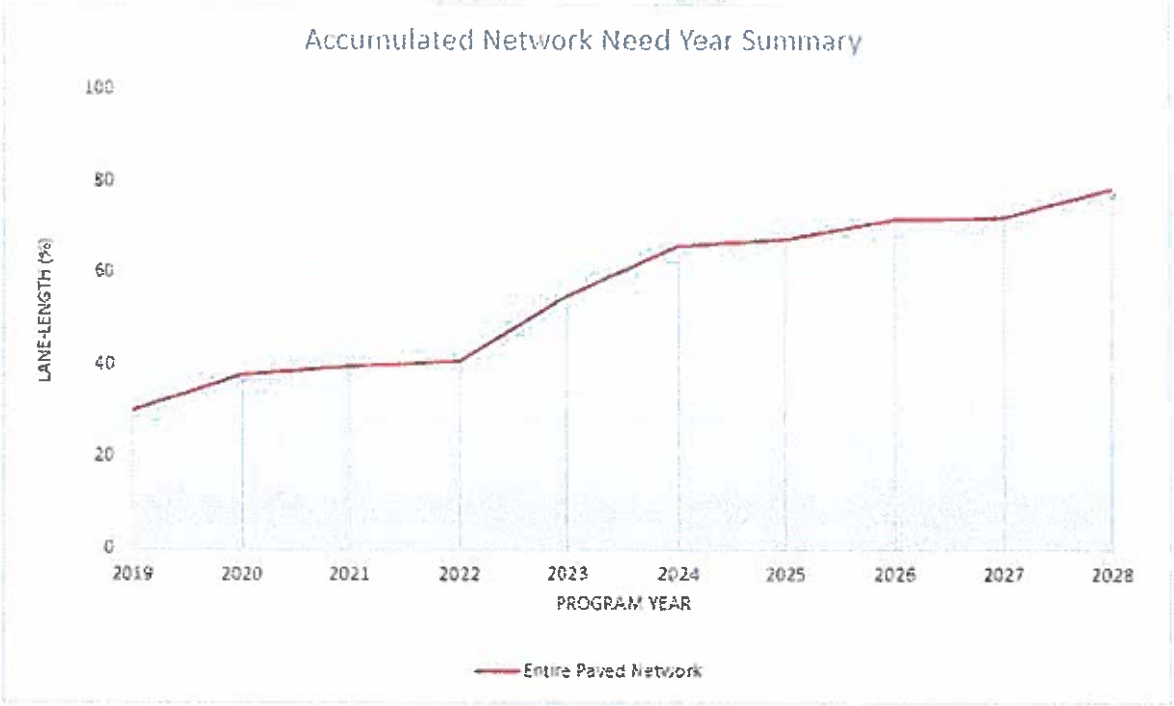


Figure 4.6: Accumulated Needs Summary (2019 – 2028)

4.2.1 Network Needs Distributions – Town Road Network

The results show that 30.1% of the network is in current need of some level of rehabilitation.

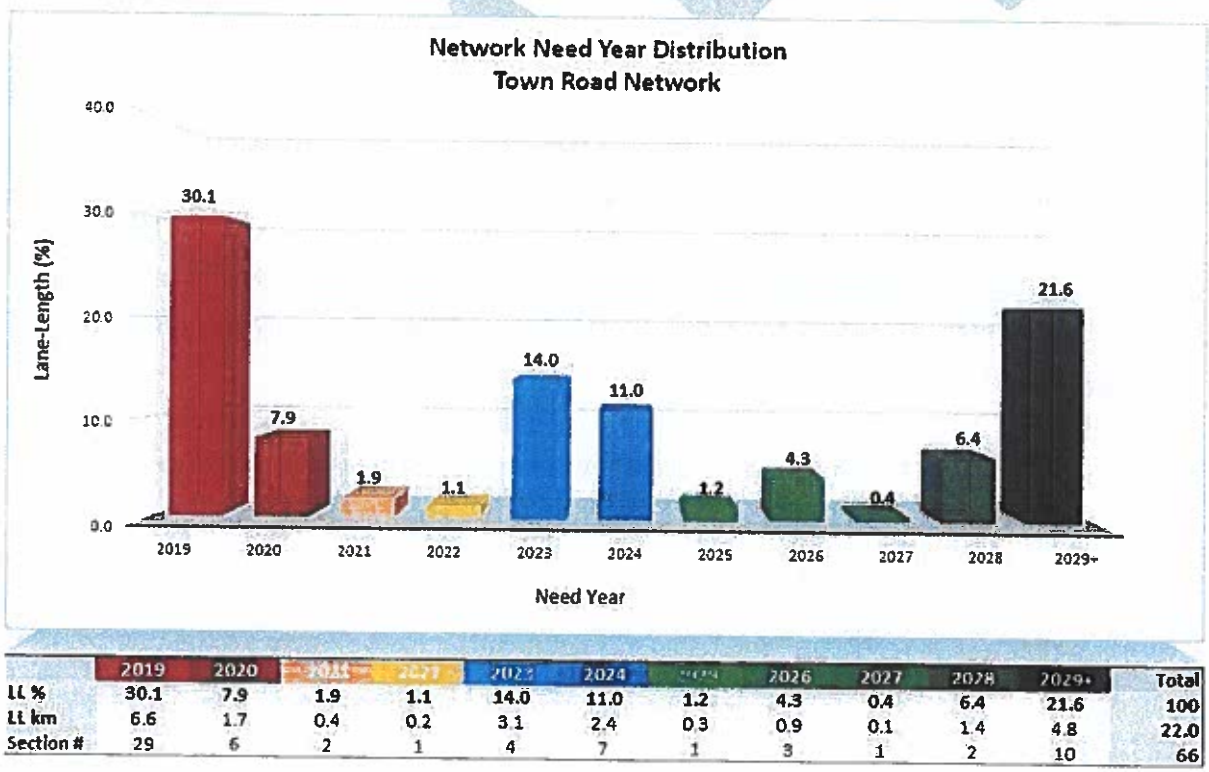
Table 4.8 shows the summary of the 10-year need driven program.

Table 4.8: Town Road Network: Accumulating 10-Year Needs Summary

PROGRAM PERIOD	NETWORK NEEDS (% LANE-LENGTH)	NETWORK NEEDS (LANE-KM)
Current (2018)	30.1	6.6
5-Year (2018 – 2022)	55.0	12.1
10-Year (2018 – 2027)	78.4	17.2

*The remaining **21.6%** of the network will become a Need beyond the 10-year programming period.*

The full Need Year distribution for the Town's Entire Paved Network is presented in **Figure 4.7**.



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029+	Total
LL %	30.1	7.9	1.9	1.1	14.0	11.0	1.2	4.3	0.4	6.4	21.6	100
LL km	6.6	1.7	0.4	0.2	3.1	2.4	0.3	0.9	0.1	1.4	4.8	22.0
Section #	29	6	2	1	4	7	1	3	1	2	10	66

Figure 4.7: Need Year Distribution – Town Road Network

4.3 2018 Priority Programming Analysis Results

The following section summarizes the results of the priority programming analysis run in the rMD application. **Table 4.9** presents the budget program results by budget scenario, network subset and impact on the overall network performance.

Table 4.9: Priority Programming Summary

BUDGET ID	BUDGET SCENARIO	10-YEAR BUDGET	2019		10-YEAR (2028)	
			OCI	%DEF	OCI	%DEF
Do Nothing	No Funding	$0	50	30.1	36	78.4
Need Driven	Unconstrained	$2.3M	76	0.0	72	0.0
$150K/Year	Annual Fixed Budget	$1.46M	53	0.0	68	23.4
$175K/Year	Annual Fixed Budget	$1.72M	53	0.0	70	13.0

4.3.1 Theoretical Analysis Scenarios

The Do Nothing and Need Driven optimizations run on the Entire Paved Network show the impact on the network performance of these two extreme theoretical scenarios. The analysis is run with these scenarios as a "what if" reference datum and it is understood they are not realistic in practice.

The analysis results show the Entire Paved Network requires approximately $2.3M over the next 10 years to address the current and predicted deficiencies. The recommended work programs will result in a network average OCI of 72 and a backlog of 0%.

Table 4.10 and **Table 4.11** show the annual funding levels and performance impact on the network of the two theoretical budget scenarios.

Table 4.10: Do Nothing Program Summary (No Funding)

YEAR	ANNUAL BUDGET	BUDGET SPENT	OCI	%DEF
2019	$0	$0	**50**	**30.1**
2020	$0	$0	48	38.0
2021	$0	$0	46	39.9
2022	$0	$0	45	41.0
2023	$0	$0	43	55.0
2024	$0	$0	42	66.0
2025	$0	$0	40	67.3
2026	$0	$0	38	71.6
2027	$0	$0	37	71.9
2028	$0	$0	**36**	**78.4**
TOTAL	**$0**	**$0**		

Table 4.11: Need Driven Program Summary (Unlimited Funding)

YEAR	ANNUAL BUDGET	BUDGET SPENT	OCI	%DEF
2019	$1,055,957	$1,055,957	**76**	**0.0**
2020	$233,328	$233,328	78	0.0
2021	$54,770	$54,770	77	0.0
2022	$27,620	$27,620	74	0.0
2023	$372,741	$372,741	75	0.0
2024	$267,572	$267,572	78	0.0
2025	$34,528	$34,528	75	0.0
2026	$102,560	$102,560	75	0.0
2027	$10,319	$10,319	73	0.0
2028	$140,651	$140,651	**72**	**0.0**
TOTAL	**$2,300,046**	**$2,300,046**		

Figure 4.8 illustrates the program summaries for theoretical budget scenarios.

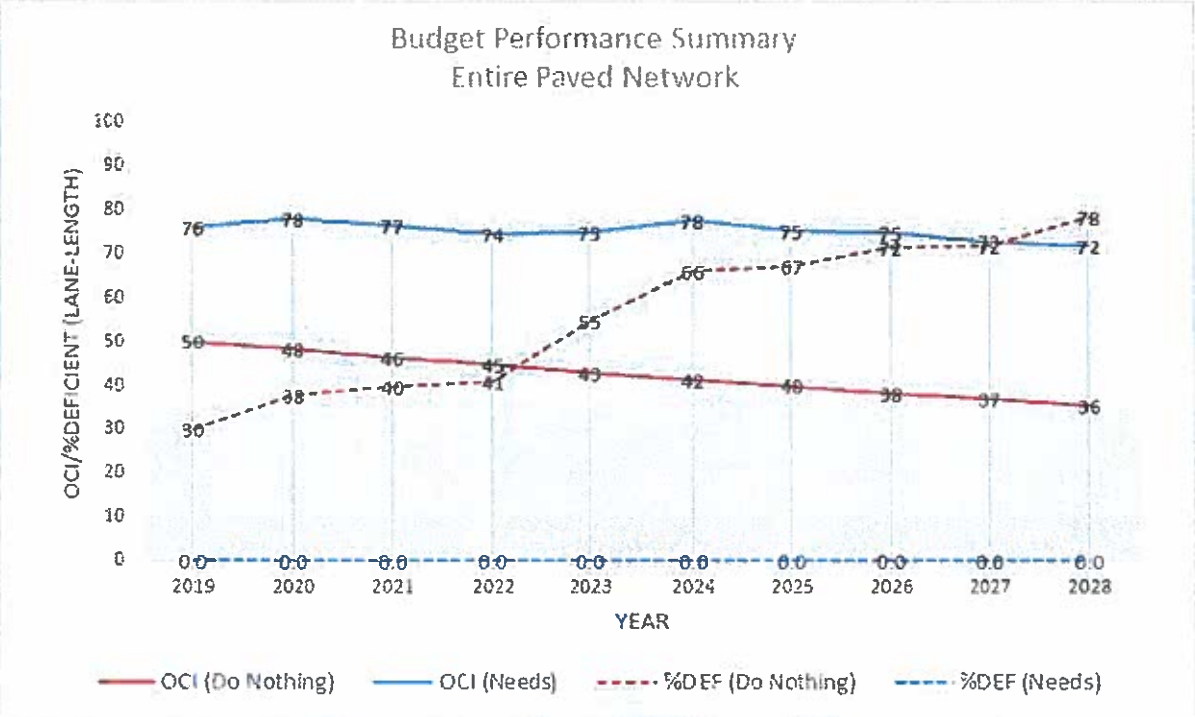


Figure 4.8: Need Driven and Do-Nothing Program Performance

4.3.2 Budget Network Scenarios

The budgets run on the Entire Paved Network show the performance impact of the two budget scenarios selected for the analysis. Both scenarios are Fixed Annual budgets. The first budget scenario is a $150K per year, over a 10-year programming period. This budget shows the level of funding required to reduce the current backlog toward the high-end (25%) of the recommended range by 2028. The second scenario applied is a $175K per year budget, showing the level of funding required to reduce the current backlog toward the low-end (10%) of the recommended range by the end of the programming period in 2028.

Table 4.12 and **Table 4.13** show the annual funding levels and performance impact on the network of the two budget scenarios.

Table 4.12: Annual Program Summary ($150K/Year)

YEAR	ANNUAL BUDGET	BUDGET SPENT	OCI	%DEF
2019	$150,000	$145,282	53	0.0
2020	$150,000	$146,699	55	20.3
2021	$150,000	$145,804	55	23.8
2022	$150,000	$149,516	56	21.0
2023	$150,000	$147,819	58	17.3
2024	$150,000	$142,030	61	27.2
2025	$150,000	$142,465	65	35.0
2026	$150,000	$149,720	65	30.3
2027	$150,000	$149,827	69	28.5
2028	$150,000	$144,365	68	23.4
TOTAL	$1,500,000	$1,463,527		

Table 4.13: Annual Program Summary ($175K/Year)

YEAR	ANNUAL BUDGET	BUDGET SPENT	OCI	%DEF
2019	$175,000	$172,325	**53**	**0.0**
2020	$175,000	$170,658	54	19.1
2021	$175,000	$174,754	55	21.6
2022	$175,000	$168,068	58	18.1
2023	$175,000	$172,545	61	14.1
2024	$175,000	$173,719	67	24.1
2025	$175,000	$170,894	68	28.4
2026	$175,000	$169,360	71	23.2
2027	$175,000	$174,664	69	19.7
2028	$175,000	$174,832	**70**	**13.0**
TOTAL	**$175,000**	**$1,721,820**		

Figure 4.9 illustrates the selected funding program summaries.

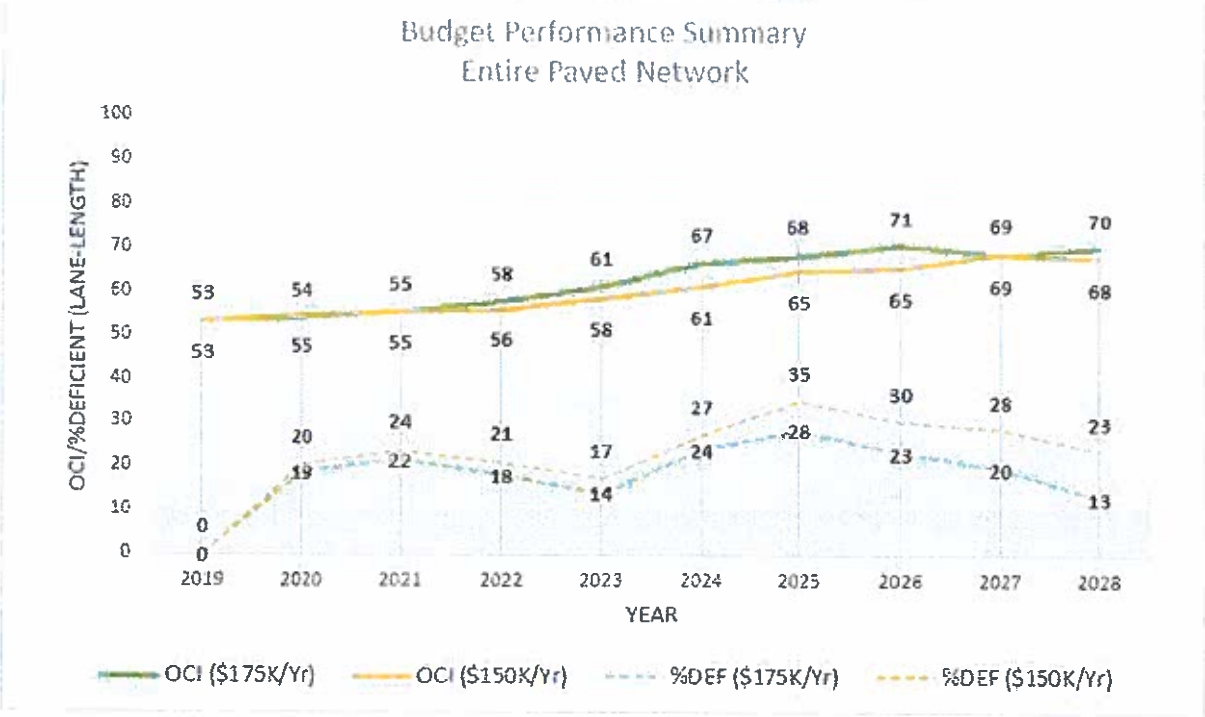


Figure 4.9 Annual Funding Program Performance

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Paved Road Network

5.1.1 Road Network: Present Condition

The analysis of the collected condition data indicates the majority of the Town's network is providing a fair level of service given the network average OCI is 58 and the 2019 needs backlog is 30.1%. The backlog is becoming unmanageable being above the recommended range of 10%–25%, traditionally considered a healthy backlog.

The results show the Town's paved roadway network is showing some distress-related deterioration, with a network average PCI of 64. The results show that the Load related defects, particularly the roughness (RCI) and the strength (SAI) are the main 'drivers' of the deterioration in the Town's roadway network. A contributing factor to the load related deterioration is that over half of the roadway network are classified as having thin pavement structures leading to more rapid deterioration.

The roughness condition of the network is in the lower marginal range with a network average RCI of 44.

The average SAI of 54 indicates the Town roadways, as a network, are just structurally adequate to carry the predicted traffic loading. The FWD results show the average SN_{eff} is 78 mm of AC, which indicate the effective asphalt thicknesses are close to, but thinner than, the estimated layer thicknesses. The average M_R of 41,877 kPa indicates adequate subgrade conditions across the network on average.

5.1.2 Road Network: Rehabilitation Programming

The results of the rehabilitation needs and priority programming analysis show that the roadway network will require approximately $2.3M over the next 10 years. This will result in a predicted network OCI of 72 and 0.0% backlog in 2028. The "Do Nothing" scenario shows the network will deteriorate to a predicted OCI of 36, with a backlog of 78.4% in 2028.

Due to the current higher level of backlog in the network, $1.1M (46%) of the needs budget allocations are required in the first year of the program (2019).

The results of the first annual funding scenario ($150K/Year) show that the network performance will improve from an OCI of 53 to 68 in 2028, with a backlog of 23.4%. This scenario shows a funding level that will reduce the backlog of the road network towards the high-end of the recommended range by 2028, with a total 10-Year funding allocation that 64% of the predicted total rehabilitation Needs costs.

The results of the second annual funding scenario ($175K/Year) show that the network performance will improve from an OCI of 53 to 70 in 2028, with a backlog of 13.0%. This scenario shows a funding level that will reduce the backlog of the road network towards the low-end of the recommended range by 2028, with a total 10-Year funding allocation that is 75% of the predicted total rehabilitation Needs costs.

The results of the rehabilitation needs analysis show the Town has a higher than recommended rehabilitation backlog. Further, the prediction results indicate a surge in the rehabilitation needs in 2023 and 2024. The Town should make fiscal preparations to address the current level of backlog in the network prior to the predicted surge.

5.1.3 Road Network: Recommendations

The review of the network condition results identify a number of roadway 'corridors' that the Town should be prepared to prioritize for rehabilitation in five years. The following roadway corridors were identified as future 'hotspots':

- 48 Ave: End – 44 St, contains four segments of pavement with an average OCI of 35.
- 49 Ave: Maple End – 49 St, contains five segments of pavement with an average OCI of 31

DRAFT

APPENDIX A

Determination of Ride Comfort Index

DRAFT

Pavement roughness may be classified into three types:

- The most commonly used roughness measurement relates to the longitudinal profile of the pavement, generally along the wheel path and involves a range of wave amplitudes and frequencies related to the smoothness of ride.
- The second type is transverse profile roughness and is generally perpendicular to the direction of travel with rut depths and vehicle maneuver considerations being important. Information with respect to transverse profile is very useful at the detailed project level of rehabilitation analysis, but not for the network level pavement management.
- A third type of roughness is micro-roughness, as determined by the surface texture of the pavement; this type is related to skid resistance.

At the network level of pavement management, the longitudinal roughness is of prime importance and thus, in this project, is the only type of roughness that is considered.

In order to represent a pavement's performance from a user perspective, a Ride Comfort Index (RCI) is determined. Acceptable performance can be gauged from a lack of persistent complaints by the traveling public and/or maintenance personnel. This complaint level is representative of a pavement's ability to carry traffic under normal operating conditions while meeting the expectations of the users.

Ride comfort can be determined by asking drivers of automobiles for their considered opinions. A systematic approach is to form a panel of raters made up of a group of local people who represent the average user of the road system and then have them rate the riding quality of a given pavement. This rating is based on the "feel" of the road that they experience and describes the riding comfort as "good," "fair," "poor," etc. It would not be very practical to have the entire network evaluated in this manner for obvious reasons; therefore, a simpler, more convenient method is employed.

The longitudinal roughness of a road segment is collected using a specially equipped van with two piezo-electric accelerometer and five laser sensors mounted rigidly to the front bumper. An on-board microprocessor transforms the acceleration and sensor readings into an International Roughness Index (IRI). In this way, all roadway distortions affecting ride are measured by vertical actions imposed on the vehicle. It is generally accepted the movement felt by a passenger would be a consequence of the movement of the vehicle; therefore, this provides for a reliable comparison between subjective ride ratings and objective mechanical measurements as collected by a test unit.

Once the network has been surveyed for roughness, segments may be rated by a panel of stakeholders such that the entire range of roughness numbers are covered. The panel's rating of "very good" to "very poor" are then converted onto a scale of zero (0) to 100, where zero represents an unacceptable ride comfort and 100 represents the best possible ride comfort. The next step involves a correlation of these converted ratings to the collected roughness numbers.

The resulting regression equation obtained from the correlation analysis represents the total spectrum of riding comfort versus unit-measured roughness. **Figure A.1** provides a graphical presentation typical of this relationship. Once this is done, all roughness numbers from the collection unit can be converted to a Ride Comfort Index (RCI). This developed procedure allows for an economical, consistent representation of the acceptability of all segments within an agency's road network.

When an agency has established an IRI–RCI correlation, it should remain reasonably stable for several years, although of course, much more frequent recalibration of the roughness device may be needed. It should be noted panel ratings might change with time and/or region. This is primarily due to the range of serviceability levels experienced by the users and to a lesser degree, to the changes in the overall serviceability spectrum of the specific network in a region and changes in vehicle characteristics.

ONOWAY RCI MODEL

The current Model to convert measured IRI (mm/m) to an RCI index score in the analysis is as follows:

$$RCI = 10 \times [8.72 - (2.2 \times Ln(IRI))]$$

where

IRI = International Roughness Index (mm/m or m/km)

RCI values determined at 30-metre intervals were used to calculate segment equivalents. These segment values were then used to generate a summary distribution and mean for the network.

Figure A.1 graphically shows the relationship between IRI and RCI used for the analysis.

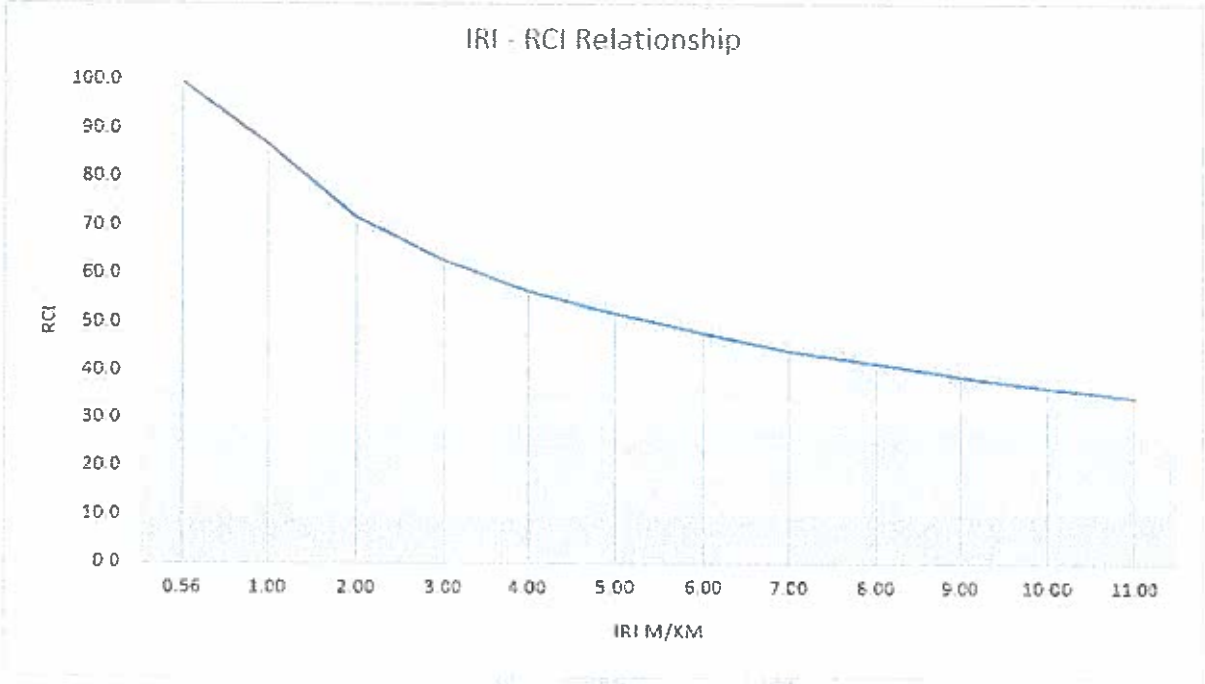


Figure A.1: Town of Onoway IRI – RCI Model

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APPENDIX B

Determination of Pavement Condition Index

DRAFT

The Pavement Condition Index (PCI) is a measure of physical pavement cracking, deformations and surface defects collectively referred to as distresses. This provides an excellent indicator of material deficiency, rate of deterioration, structural adequacy, environmental and soil type problems. The PCI is, therefore, a key indicator of pavement performance, which may be used to monitor the condition of the network, assess future needs, establish ranking and optimize expenditures. It will also provide information to monitor the performance of various design, rehabilitation and maintenance techniques and to provide information for identifying candidate projects for maintenance and improvement programs.

The procedure described herein was developed as a means of converting the flexible pavement surface distress ratings produced by the operators of the survey unit into index values between zero (0) and 100. This includes the production of indicators for individual distress types at each station, the production of one index value for each station (i.e., combining all types of distress into one value) and the production of one index value for an entire pavement segment.

DISTRESS CODES

The pavement distress manifestations evaluated by the raters are recorded in the survey unit in a coded form which ranges from 00 (no distress) to 25 (severe throughout). The first digit is the severity and the second digit is the extent as described in **Table B.1**.

Table B.1: Severity and Extent Codes

NUMERIC CODE	SEVERITY DEFINITION	EXTENT DEFINITION
0	Slight	None
1	Moderate	Few
2	Severe	Intermittent
3		Frequent
4		Extensive
5		Throughout

For example, if alligator cracking on a flexible pavement is found to be moderate in severity and extensive in occurrence, a value of '14' would be recorded, the '1' indicating moderate severity and the '4' indicating extensive occurrence.

There are 12 types of distresses considered in the formulation of PCI as indicated in **Table B.2**. A code is assigned to each distress type for every station sampled along the length of a pavement segment.

Table B.2: Distress Types

CODE	DISTRESS ID	DISTRESS NAME
1	PAT	Patching & Utility Cuts
2	RPL	Rippling & Shoving
3	RAV	Raveling & Weathering
4	FLU	Flushing & Bleeding
5	DST	Deformations & Distortions
6	EDG	Progressive Edge Cracking
7	ALG	Alligator & Fatigue Cracking
8	POT	Potholes
9	MAP	Map & Block Cracking
10	LON	Longitudinal Cracking
11	TRN	Transverse Cracking
12	RUT	Wheel Path Rutting

DISTRESS SCORES

To summarize the data for each segment, the distresses are combined into a single index (PCI), which is calculated using the deduct point system. The amount deducted is a function of the extent, type and severity of the distress. Deduct Value (DV) models are set up for each distress type and are comprised of three curves of Slight, Moderate and Severe. The %Area quantity of the reported distress, at the identified severity level, is run through the DV model to determine the DV score of each distress type. The more critical the distress type (e.g., Alligator Cracking), the more severe the deduct modeling.

The DV type, distress density measurement, and the DV model coefficients 'a' and 'b' for the distresses included in PCI calculation are listed in **Table B.3**.

Table B.3: Pavement Distress Deduct Value Model Coefficients

DISTRESS TYPE	QUANTITY MEASUREMENT	SLIGHT		MODERATE		SEVERE	
		Coef A	Coef B	Coef A	Coef B	Coef A	Coef B
Alligator Cr	% Area	0.039	0.4136	0.284	0.3421	0.455	0.2839
Map Cr	% Area	-1.052	0.8114	-0.619	0.7034	-0.209	0.5878
Long. Cr	% Lineal/Area	-0.531	0.6419	-0.075	0.4808	0.187	0.4997
Trans. Cr	% Lineal/Area	-0.531	0.6419	-0.075	0.4808	0.187	0.4997
Edge Cracking	% Area	-0.536	0.5538	-0.055	0.3960	0.171	0.3855
Bleeding	% Area	-1.134	0.6962	-0.563	0.6067	-0.241	0.5655
Distortion	% Area	-0.666	0.6533	-0.076	0.5511	0.295	0.3930
Rutting	% Area	-0.307	0.5507	0.117	0.4016	0.306	0.3711
Rippling	% Area	-0.490	0.7179	-0.007	0.5152	0.292	0.3844
Raveling	% Area	-0.812	0.5202	-0.065	0.3471	0.214	0.3670
Patching/Utility Cuts	% Area	-0.871	0.4383	-0.719	0.4878	-0.338	0.4737
Potholes	% Area	0.664	0.5162	1.024	0.5780	1.102	0.3879

INDIVIDUAL DISTRESS DEDUCT VALUES

The equation to calculate the individual distress DV is as follows:

$DV_i = 10^{\wedge} (a + b * LOG(\%Area))$

where

%Area = percent area of the distress/severity occurrence

The DV for a distress type is the sum of the combined severity-extend deduction for that distress type.

ADJUSTED DISTRESS SCORES

The Total Deduct Value (TDV) is then calculated as the sum of the individual distress values:

$TDV = sum (DV_i)$

The Adjusted Deduct Value (ADV) is then calculated from the TDV based on the number of equivalent distresses (NED) present. The NED is calculated as the sum of the ratios of each distress value to the maximum distress value (DV_{max}). The DV_{max} is the largest DV observed for the data. This can be expressed as:

$$NED = sum (DV_i/DV_{max})$$

where

DV_i = distress value for distress/severity level

DV_{max} = highest distress value observed

The ADV is calculated using the following equation:

$$ADV = 10 \times (-0.5 \times LOG(NED) + LOG(TDV))$$

The ADV–TDV correlation is graphically presented in **Figure B.1**.

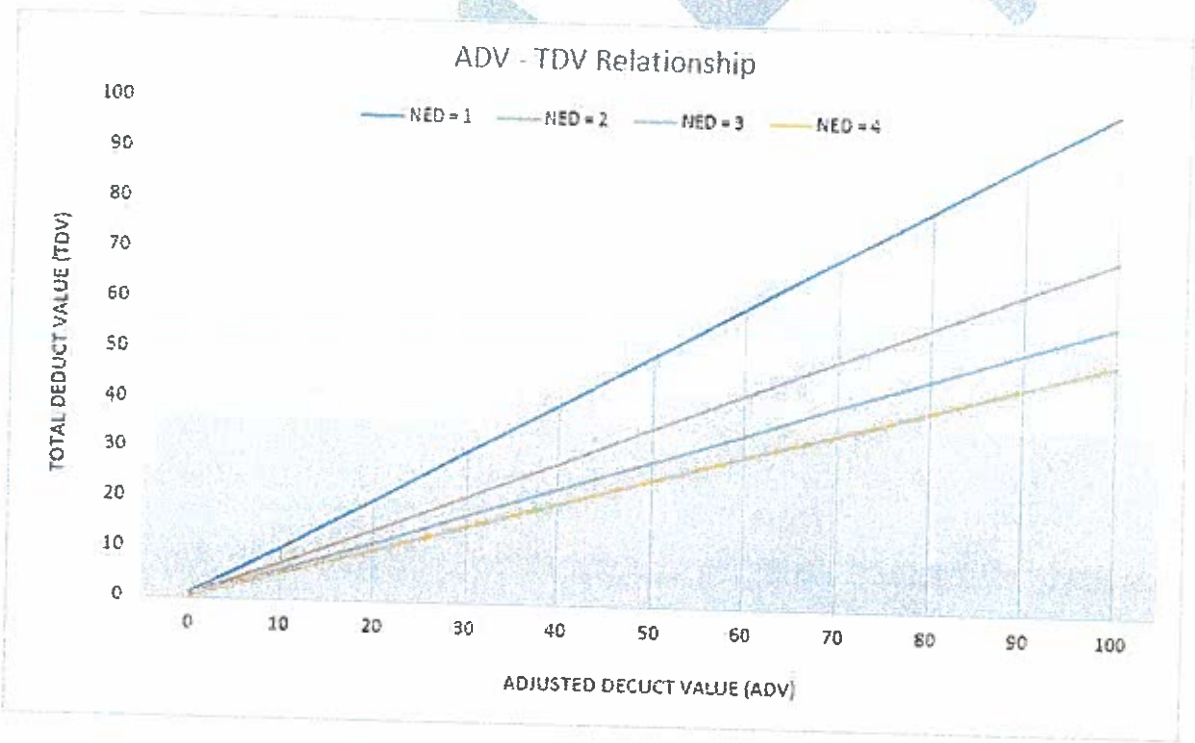

Figure B.1: ADV and TDV Correlation

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PAVEMENT CONDITION INDEX (PCI)

Final PCI scores are calculated as follows:

$$PCI = PCI_M - ADV$$

where

PCI_M is the Maximum PCI score of 100

The PCI for each pavement segment is determined after all stations have been processed. This involves evaluating the contribution of each of the 12 individual distress items to the segment PCI.

PCI values determined at 30-metre intervals were used to calculate segment equivalents. These segment values were then used to generate a summary distribution and mean for the network.

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APPENDIX C

Determination of Structural Adequacy Index

DRAFT

The structural adequacy of a pavement indicates the pavement's ability to carry expected traffic loads while providing an acceptable level of service. The structural capacity of a pavement is determined by analyzing the measured deflection of the pavement under a controlled loading condition and comparing this response to the maximum allowable deflection associated with anticipated loading conditions.

The deflection measurements are adjusted for temperature and seasonal influences using the following models developed by the Alberta Research Council in conjunction with the Alberta Transportation Benkelman Beam testing programs. Dynaflect deflections are first converted to Benkelman Beam and then temperature corrected using the following models:

For granular based pavements:

$D_C = D * 10^{(0.0091 * (20 - T))}$

For full depth pavements:

$D_C = D * 10^{(0.012 * (20 - T))}$

Where, D_C is the corrected BBeam value; D is the raw measured BBeam value; and T is the pavement temperature in °C.

There is no temperature correction made for soil cement based pavements.

The following seasonal adjustment factors are applied to the temperature corrected deflection measurements:

For granular base and full-depth pavements:

Tests between April 15 and June14: $D_A = D_C * (1.2 - d/300)$

Tests after June14: $D_A = D_C * 1.2$

Where, D_A is the adjusted BBeam value; D_C is the temperature corrected BBeam value; and d is the number of days prior to June 15.

For soil cement base pavements:

Table C.1: Seasonal Adjustment Factors for Cement Stabilized Pavements

MONTH OF TESTING	ADJUSTMENT FACTOR
April	1.00
May	1.06
June	1.24
July	1.33
August	1.30
September-November	1.16

Seasonally adjusted deflection measurements are used along with traffic data to determine SAI values for each section.

The Structural Adequacy of a pavement is determined by comparing the measured deflection of the pavement with a criterion of structural adequacy, including the pavement structure and traffic loading. This appendix summarizes the method used to determine the Structural Adequacy Index (SAI) of the pavements considered in this study.

TRAFFIC ANALYSIS

Traffic Analysis predicts traffic-loading conditions on the pavement network based on vehicle characteristics and traffic volume. The Design Traffic Number and Total Equivalent Standard Axle Loads for the programming period are important pavement design parameters. Some of these parameters are required for further analyses.

The following steps are performed for each section in the current network subset during Traffic Analysis:
Calculate the traffic level in the first year of the programming period ($AADT_1$):

$$AADT_1 = AADT_{Measured} \bullet \left(1 + \frac{Growth}{100}\right)^{(Year_1 - Year_{Measured})}$$

where

$AADT_{Measured}$ = Measured or estimated traffic volume

$Year_1$ = First year of the programming period

$Year_{Measured}$ = Year of traffic measurement or estimation

Growth = Traffic growth rate

Determine the lane distribution factor (Distribution):

The concept of a 'design lane' is used in the structural design of pavements. The lane (or load) distribution factor represents the proportion of the total traffic volume to use the 'design lane.'

Table C.2: Lane Distribution Factors

NUMBER OF LANES	ADJUSTMENT FACTOR
0.5 (two directions share one lane)	2.00
1	1.00
2	0.80
3	0.70
4	0.55
5+	0.40

Calculate the average growth factor (GF_{Period}):

$$GF_{Period} = \frac{1 + \left(1 + \frac{Growth}{100}\right)^{Period}}{2}$$

where

Growth = % Traffic growth rate

Period = Period of calculation (1 year or the length of the programming period)

Calculate the design traffic volume (DTV_{Period}). The design traffic volume represents the traffic expected to travel in the 'design lane' on the average day:

$$DTV_{Period} = AADT_1 \bullet GF_{Period} \bullet \frac{Distribution}{Directions}$$

where

$AADT_1$ = Traffic volume updated to the first year of the programming period

GF_{Period} = Average growth factor for the period of calculation

Distribution = Lane distribution factor

Directions = Number of directions of travel (1 or 2)

Period = Period of calculation (1 year or the length of the programming period)

Calculate the truck factor (TF_{Period}). The truck factor converts the load applied to the pavement by a truck to an equivalent number of 18 kip (80 kN) standard axle loads. The standard axle load is the standard used to express the load demand on pavement structures:

$$TF_{Period} = 0.0353 + 0.003 \bullet DTV_{Period}$$

where

TF_{Period} is range limited (0.75 in. ≤ TF_{Period} ≤ 2.00 in.)

DTV_{Period} = Design traffic volume

Period = Period of calculation (1 year or the length of the programming period)

Calculate the design traffic number for the programming period (DTN_{Period}). The design traffic number represents the number of standard axle loads expected to travel in the 'design lane' on the average day:

$$DTN_{Period} = DTV_{Period} \bullet \frac{Commercial}{100} \bullet TF_{Period}$$

where

DTV_{Period} = Design traffic volume for the programming period

Commercial = Commercial traffic content

TF_{Period} = Truck Factor for the programming period

Period = Length of the programming period

Calculate the Total Equivalent Single Axle Loads ($TESALS_{Period}$). The Total Equivalent Single Axle Loads represent the number of standard axle loads expected to be applied over the first year and the programming period:

$$TESALS_{Period} = DTV_{Period} \bullet \frac{Commercial}{100} \bullet TF_{Period} \bullet Period \bullet Days$$

where

DTV_{Period} = Design traffic volume for the period of calculation

Commercial = % Commercial traffic content

TF_{Period} = Truck Factor for the period of calculation

Period = Period of calculation (1 year or the length of the programming period)

Days = Number of days per year represented in the AADT (normally 360 days)

SAI ANALYSIS

Calculate the Equivalent Dynaflect Deflection (D_F) from the FWD Sensor1 values.

$$D_F = 0.1716 \bullet (FWD_1)\text{^}0.6634$$

where

FWD₁ = FWD Sensor 1 value

Calculate the Benkelman Beam rebound (D_B) from the Dynaflect Deflection. Model used for the 2018 analysis was the Soil Cement (BSC).

$$D_B = (-5.9664 + (27.1728 \bullet D_F))/1000$$

where

D_F = Dynaflect Sensor 1 equivalent

Calculate the Structural Adequacy Index (*SAI*).

$$SAI = 10 \bullet (10\text{^}(1.26962 + (0.000267 \bullet (EF5 + 7.6)\text{^}2.088) - (0.00988 \bullet D_B \bullet (EF5 + 7.6)\text{^}2.14) - (11.885 \bullet D_B)))$$

where

D_B = Benkelman Beam Rebound (mils)

EF5 = $TESALS_{Period}$ ($x10^{-5}$)

The SAI is represented by a value on a scale of zero (0) to 100, where a value of 50 represents a structural strength that just adequately supports the current traffic loads; a value less than 50 represents inadequate structural support; and a value greater than 50 represents more-than-adequate structural support.

APPENDIX D

Determination of Overall Condition Index

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The Overall Condition Index (OCI) is used to provide a single overall assessment of pavement quality. The OCI is calculated as a function of one or more of the key Performance Indicators: the Pavement Condition Index (PCI), the Ride Comfort Index (RCI), and the Structural Adequacy Index (SAI).

The OCI models used in the analysis are as follows:

Model 1

$OCI = 0.3456 + 0.7988*RCI + 0.0454*PCI^2$

This model is applied to segments that do not have SAI scores.

Model 2

$OCI = 1.8455 + 0.2052*SAI + 0.0957*RCI*PCI$

This model is applied to segments that have SAI scores.

Model 3

$OCI = PCI$

This model is used when only PCI scores are available for a segment.

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APPENDIX E

Cause-Condition Matrices

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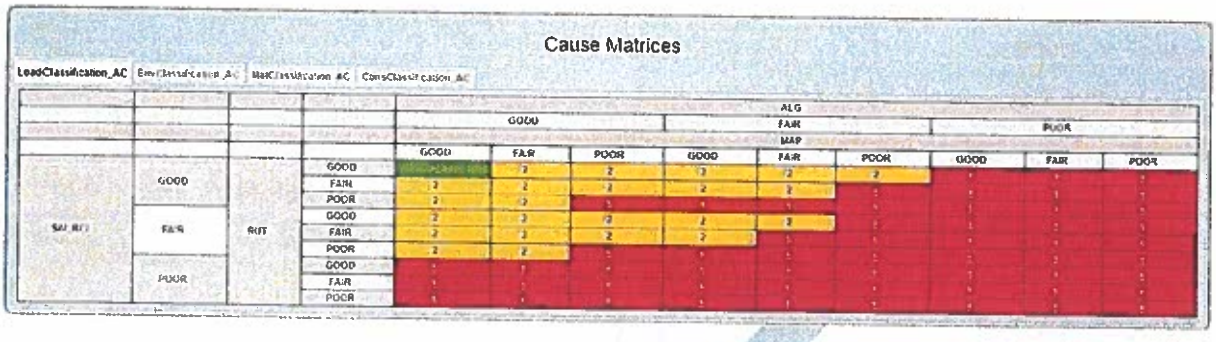
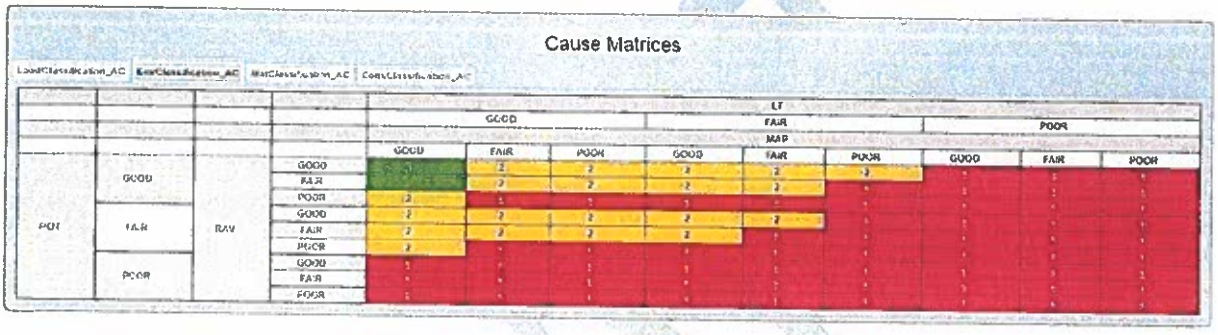
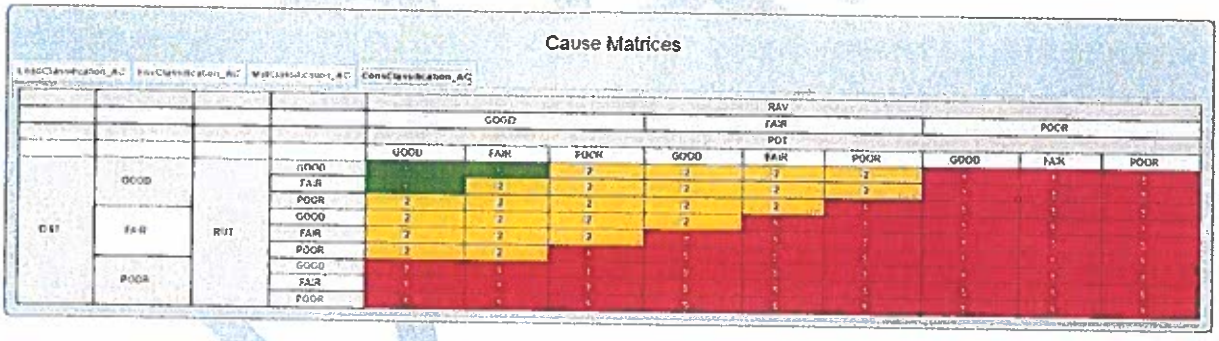
LOAD



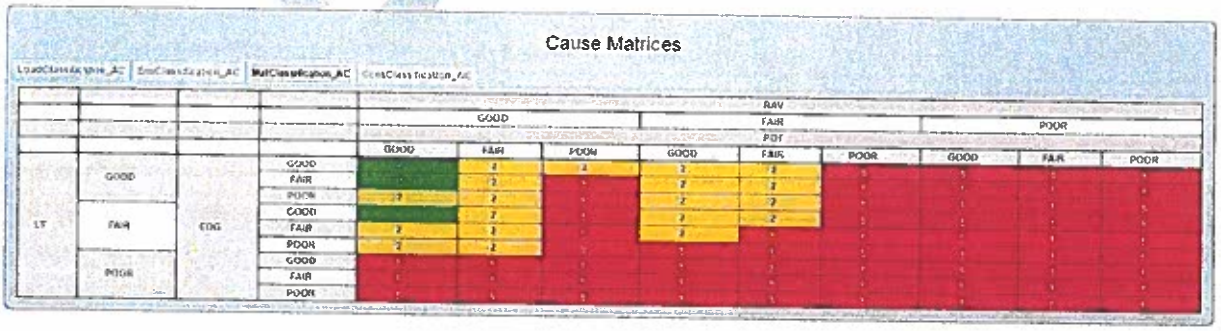
ENVIRONMENT



CONSTRUCTION



MATERIAL



APPENDIX F

Decision Matrices

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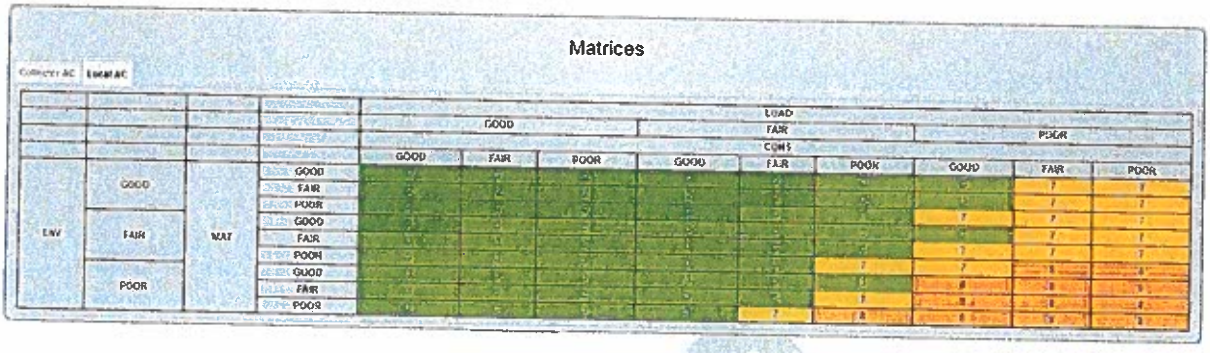
TOWN ROAD NETWORK



REHABILITATION ALTERNATIVES

APPENDIX G

2019 Pavement Condition and 10-Year Rehabilitation Needs – Segment Listing

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TOWN OF ONOWAY

PAVEMENT CONDITION AND 10-YEAR REHABILITATION LISTING

Segment ID

SEGMENT ID	STREET	FROM	TO	FUNC ID	PAVEMENT	LANES	LANE-KM	WIDTH	YEAR	FIELD OCI	PCI	RCI	SRI	IRI (m/km)	LOAD COND.	CONST COND.	MATERIAL COND.	ENVIRON COND.	DATA YEAR	TRAF LEVEL	ECT LEVEL	SURCHRG LEVEL	REHAB TREATMENT LEVEL	COST
10	Lac St. Anne Trail South	Town Limits	52 Street	Collector	AC	2	1.300	2020	15.0	42.0	54.0	73.0	3.80	GOOD	GOOD	GOOD	FAIR	2018	Med	Med	Strong	Overlay 50mm	$147,810
20	Lac St Anne Trail South	52 Street	51 Street	Collector	AC	2	0.339	2018	42.5	31.3	42.7	79.1	4.11	GOOD	GOOD	GOOD	FAIR	2018	Low	Med	Strong	Overlay 50mm	$41,019
30	Lac St Anne Trail South	51 Street	50 Street	Collector	AC	2	0.346	2020	42.5	36.0	38.1	75.3	4.57	GOOD	GOOD	GOOD	FAIR	2018	Low	Med	Strong	Overlay 50mm	$41,830
40	Lac St Anne Trail South	50 Street	49 Street	Collector	AC	2	0.356	1826	15.0	58.2	39.6	73.6	4.58	GOOD	GOOD	GOOD	FAIR	2018	Low	Med	Strong	Overlay 50mm	$41,830
60	52 Street	Start of Asphalt	47 Avenue	Local	ACS	2	0.367	2010	48.2	55.4	86.2	15.0	4.39	POOR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$38,483
70	52 Street	47 Avenue	49 Avenue	Local	ACS	2	0.367	2010	48.2	55.4	86.2	15.0	4.39	POOR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$38,483
80	52 Street	49 Avenue	Lac St Anne Trail South	Local	ACS	2	0.184	2003	51.0	75.2	91.5	81.6	5.70	GOOD	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$54,317
120	49 Avenue Loop	49 Avenue	49 Avenue	Local	AC	2	0.330	2012	34.6	31.0	27.0	59.6	6.58	FAIR	GOOD	GOOD	FAIR	2018	Low	Med	Strong	Overlay 50mm	$39,483
130	53 Street	End	49 Avenue	Local	AC	2	0.161	2019	33.4	41.9	31.0		6.78	POOR	GOOD	GOOD	FAIR	2018	Low	Med	Strong	Overlay 75mm	$23,678
140	53 Street	49 Avenue	End	Local	AC	2	0.072	2019	30.9	40.6	35.0		6.20	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$21,796
150	49 Avenue	End	53 Street	Local	AC	2	0.064	2019	29.6	41.3	35.0		6.16	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$11,827
160	49 Avenue	53 Street	52 Street	Local	AC	2	0.109	2020	31.4	0.1	35.0		5.05	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$9,794
170	49 Avenue	52 Street	51 Street	Local	AC	2	0.161	2019	27.7	33.9	33.8		7.07	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Full Mill and Overlay + LBA	$37,823
180	49 Avenue	51 Street	50 Street	Local	AC	2	0.200	2019	26.0	20.7	33.6		6.50	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$53,517
190	49 Avenue	50 Street	49 Street	Local	AC	2	0.548	2019	25.1	22.4	24.3		7.02	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$99,906
200	47 Avenue	52 Street	51 Street	Local	AC	2	0.359	2010	58.7	42.9	27.4		6.66	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$53,391
210	47 Avenue	51 Street	Unknown	Local	ACS	2	0.450	2010	98.2	100.0	69.5	55.7	2.47	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$54,937
220	47 Avenue	Unknown	50 Street	Local	ACS	2	0.150	2002	108.0	100.0	77.7	76.0	1.42	GOOD	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$18,322
230	47 Avenue	50 Street	49 Street	Local	ACS	2	0.252	2002	95.0	100.0	68.4	58.0	2.00	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$30,802
240	47 Avenue	49 Street	Payne Avenue	Local	ACS	2	0.722	2002	108.0	100.0	90.4	52.3	0.95	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$87,134
250	47 Avenue	Payne Avenue	47 Street	Local	ACS	2	0.954	2002	108.0	100.0	97.8	54.5	1.03	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$46,519
260	47 Avenue	47 Street	46 Avenue	Local	ACS	2	0.774	2002	108.0	100.0	86.4	90.6	1.1	GOOD	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$61,427
270	51 Street	48 Avenue	49 Avenue	Local	ACS	2	0.065	2002	63.0	80.1	30.1		4.55	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$49,836
280	51 Street	49 Avenue	Lac St Anne Trail South	Local	AC	2	0.213	2018	42.5	47.1	26.3		5.03	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$18,319
300	50 Street	47 Avenue	48 Avenue	Local	AC	2	0.196	2020	43.0	29.6	32.7		8.12	FAIR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$34,393
310	50 Street	48 Avenue	49 Avenue	Local	ACS	2	0.181	2019	38.1	68.4	16.8		11.80	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$29,144
320	50 Street	49 Avenue	Lac St Anne Trail South	Local	AC	2	0.206	2019	27.0	62.1	0.0		11.91	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$33,561
330	48 Avenue	51 Street	Unknown	Local	AC	2	0.204	2002	58.5	75.7	25.9		6.97	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$31,331
340	48 Avenue	Unknown	50 Street	Local	ACS	2	0.090	2010	30.1	11.0	20.9	12.0	6.58	POOR	POOR	POOR	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$20,407
350	48 Avenue	50 Street	49 Street	Local	ACS	2	0.267	2010	61.6	80.8	30.0	20.7	3.19	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Weak	Local Reconstruction	$64,295
360	48 Avenue	49 Street	48 Street	Local	ACS	2	0.391	2010	61.3	63.0	30.4	9.0	5.98	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$36,831
370	48 Avenue	48 Street	47 Street	Collector	AC	2	0.132	2010	44.3	63.0	25.0	21.0	4.80	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Weak	Overlay 75mm	$51,849
380	48 Avenue	47 Street	46 Street	Collector	AC	2	0.346	2010	38.6	64.5	17.0	60.7	8.71	POOR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 50mm	$17,188
390	46 Avenue	46 Street	45 Street	Collector	AC	2	0.386	2019	36.6	34.4	31.1	53.0	8.13	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$38,714
400	46 Avenue	45 Street	44 Avenue	Collector	AC	2	0.180	2014	37.4	63.1	44.6	58.7	3.76	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$18,180
410	46 Street	44 Avenue	Yeoman Avenue	Collector	AC	2	0.470	2019	37.2	36.3	25.7	48.3	7.12	FAIR	FAIR	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$1
420	46 Street	Yeoman Avenue	47A Avenue	Collector	AC	2	0.137	2020	33.9	61.3	34.5	74.3	5.07	GOOD	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$
430	47A Avenue	44 Street	Miller Drive	Collector	AC	2	0.216	2001	46.6	72.4	26.3	56.1	6.53	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$
440	Miller Drive	47A Avenue	Payne Avenue	Collector	AC	2	0.172	2019	37.6	62.3	17.6	60.5	8.54	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$
450	Payne Avenue	End	Miller Drive	Local	AC	2	0.175	2019	36.0	78.0	15.3	26.2	9.23	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$21,4...
460	Payne Avenue	Miller Drive	47 Avenue	Collector	AC	2	0.678	2014	34.6	85.5	24.6		6.84	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$42,799
470	48 Street	47 Avenue	47A Avenue	Collector	AC	2	0.200	2013	34.3	108.0	23.6		5.04	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$19,756
480	48 Street	47A Avenue	46 Avenue	Local	AC	2	0.242	2012	31.8	71.6	34.1	49.3	5.23	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 75mm	$38,679
490	49 Street	46 Avenue	49 Avenue	Local	AC	2	0.335	2019	36.0	29.0	34.3	52.7	7.18	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$27,620
500	49 Street	49 Avenue	50 Avenue	Local	AC	2	0.191	2019	34.3	31.8	33.8	58.5	9.58	FAIR	GOOD	GOOD	FAIR	2018	Low	Thin	Strong	Overlay 75mm	$30,966
510	49 Street	50 Avenue	Lac St Anne Trail North	Collector	AC	2	0.201	2020	40.6	44.3	29.3	67.6	8.39	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 75mm	$15,585
520	49 Street	Lac St Anne Trail North	53 Avenue	Local	ACS	2	0.230	2022	71.0	72.3	53.6	75.3	3.16	GOOD	GOOD	GOOD	GOOD	2016	Low	Med	Strong	Overlay 50mm	$24,486
530	53 Avenue	49 Street	50 Street	Local	ACS	2	0.254	2020	40.0	53.4	30.9	49.3	4.54	FAIR	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$18,693
540	53 Avenue	50 Street	Start of Gravel	Local	ACS	2	0.136	2019	31.0	98.1	17.6	25.7	6.40	POOR	FAIR	FAIR	GOOD	2018	Low	Thin	Weak	Overlay 75mm	$16,097
550	56 Street	End	53 Avenue	Local	ACS	2	0.457	2020	48.6	81.2	33.6	79.8	5.84	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Weak	Full Mill and Overlay + LBA	$47,796
560	Lac St Anne Trail North	48 Street	Industrial Avenue	Collector	AC	2	0.237	2022	76.0	99.3	34.0		5.06	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Weak	Overlay 75mm	$47,953
590	Lac St Anne Trail North	Industrial Avenue	Range Road 21	Collector	ACS	2	1.710	2020	84.0	63.3	51.3	75.1	3.22	GOOD	GOOD	GOOD	GOOD	2018	Med	Med	Strong	Overlay 50mm	$93,458
600	Lac St Anne Trail North	Range Road 21	Hwy 37	Collector	ACS	2	1.714	2013	53.5	51.7	42.8	47.6	4.04	FAIR	GOOD	GOOD	GOOD	2018	Med	Med	Strong	Overlay 50mm	$157,860
620	Industrial Avenue	Lac St Anne Trail North	Rankin Street	Local	ACS	2	0.642	2018	38.0	84.0	68.5	78.2	4.35	GOOD	GOOD	GOOD	GOOD	2018	Low	Med	Strong	Overlay 50mm	$190,575
630	Industrial Avenue	Rankin Street	43 Street	Local	ACS	2	0.840	2023	57.0	84.4	48.5	38.5	4.06	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Weak	Overlay 75mm	$45,000
650	47A Avenue	48 Street	47 Street	Local	ACS	2	0.824	2005	86.6	98.5	58.6	61.1	2.70	GOOD	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$114,585
660	47 Street	48 Avenue	47A Avenue	Local	AC	2	0.192	2019	44.0	24.5	44.0		2.74	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$48,180
670	47 Street	47A Avenue	47A Avenue	Local	AC	2	0.189	2019	23.0	44.3	20.0		8.35	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$33,930
680	47A Avenue	47A Avenue	47 Street	Local	AC	2	0.186	2019	43.9	62.7	30.8		5.56	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$30,523
690	46 Street	47A Avenue	46 Avenue	Local	AC	2	0.186	2020	48.3	58.6	30.8		4.91	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$29,751
700	45 Street	46 Avenue	Yeoman Avenue	Local	AC	2	0.160	2020	51.3	83.4	44.0		3.72	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$20,131
710	Yeoman Avenue	45 Street	Yeoman Close	Local	AC	2	0.168	2025	98.5	89.5	84.6		6.87	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$30,515
720	Yeoman Avenue	Yeoman Close	44 Street	Local	AC	2	0.137	2020	84.7	91.6	59.0		6.03	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$24,588
730	Yeoman Close	Yeoman Avenue	End	Local	AC	2	0.294	2006	65.5	74.1	34.0		5.48	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$33,791
740	48 Avenue	46 Street	Lovell Close	Local	AC	2	0.099	2004	57.5	66.4	42.9		5.90	FAIR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$25,700
750	Lovell Close	48 Avenue	End	Local	AC	2	0.167	2010	50.4	67.1	36.0		4.81	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 50mm	$14,677
						2	0.107	2019	38.7	18.5	31.0		5.39	POOR	GOOD	GOOD	GOOD	2018	Low	Thin	Strong	Overlay 75mm	$47,849
																								$15,816

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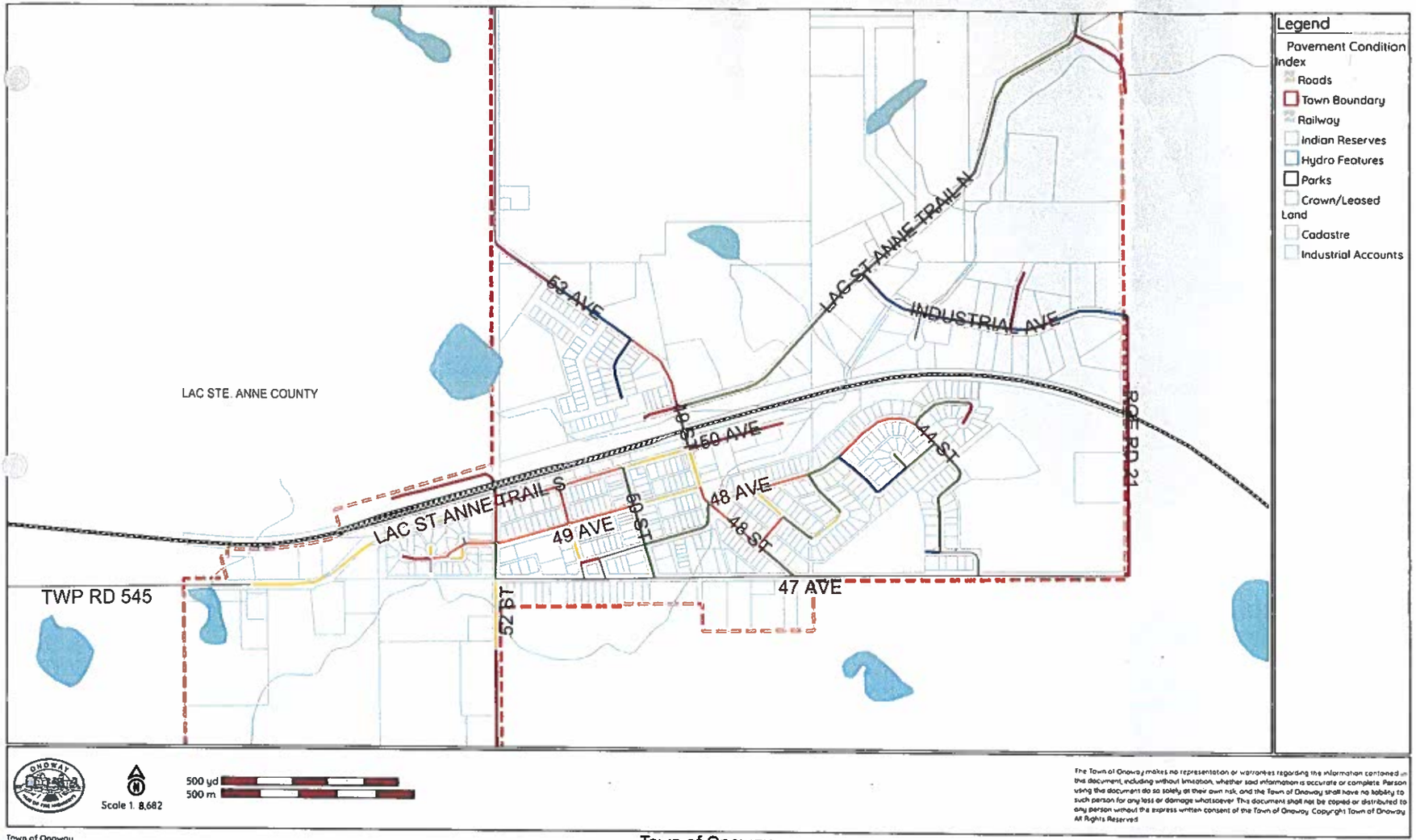
LAC STE. ANNE COUNTY
53 AVE
LAC ST ANNE TRAIL N
INDUSTRIAL AVE
ROE RD 21
50 ST
50 AVE
44 ST
LAC ST ANNE TRAIL S
49 AVE
48 AVE
48 ST
TWP RD 545
52 ST
47 AVE
Legend
Pavement Condition Index
Roads
Town Boundary
Railway
Indian Reserves
Hydro Features
Parks
Crown/Leased Land
Cadastre
Industrial Accounts
Scale 1: 8,682
500 yd
500 m
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Town of Onoway
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Date Created: 10/5/2021

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ENGINEERING AND ENVIRONMENTAL SERVICES

BRETZLAFF PARK IMPROVEMENTS

Prepared For:
Town of Onoway

Property Description:
Bretzlaff Park
Onoway, AB

Project Number:
110-1925

ONOWAY
HUB OF THE HIGHWAYS

Prepared By:

PROFESSIONAL ENGINEER ALBERTA
TRENT THOMPSON

Rev.	Date	Description
B	*8-Aug-19*	Issued to Client
A	*6-Aug-19*	Issued for Internal Review

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ENGINEERING AND ENVIRONMENTAL SERVICES

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DWG DD-110-1925-01 – *SITE PLAN*
DWG DD-110-1925-02 – *GRADING PLAN*
CONSTRUCTION ESTIMATE

BOLSON
ENGINEERING AND ENVIRONMENTAL SERVICES

1. INTRODUCTION

1.1 PURPOSE

A review of the existing Bretzlaff Park was conducted to assess the feasibility and estimated budget of constructing a new soccer field, basketball court, and tennis court on the premises. The results of our investigation are outlined below.

1.2 PLAN AREA

The existing Bretzlaff Park consists of a partial asphalt paved basketball court, some overgrown parking area, and an agricultural field. The park has been unused for several years and is bounded on the south by 44th street, on the west by residential properties, and on the north and east with additional agricultural land. Figure 1.0 – Location Plan outlines the area that was assessed.

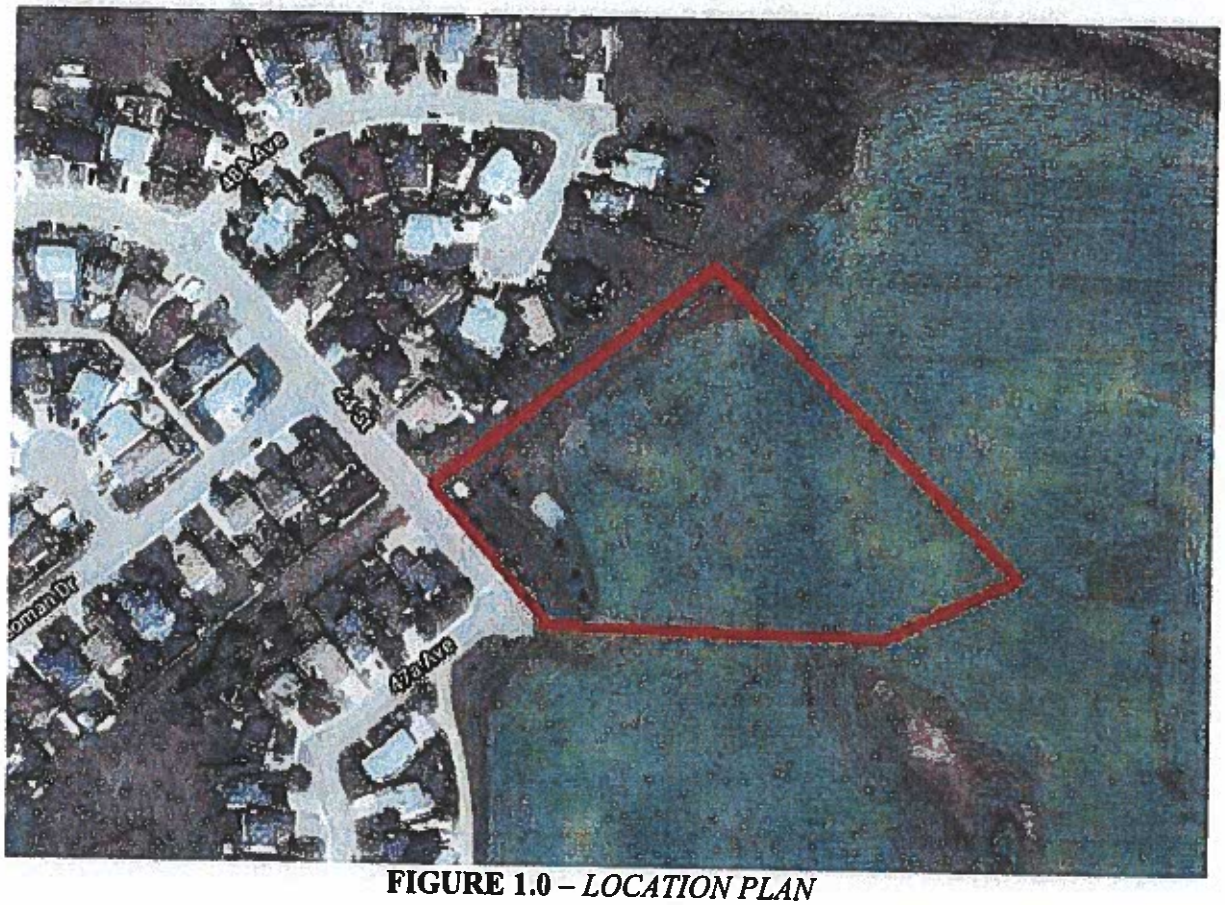

FIGURE 1.0 – *LOCATION PLAN*

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1.3 Proposed Remediation Design

It is proposed to revitalize the existing park by constructing a new soccer field, new tennis court, and new basketball court. A separate graveled parking area would also be developed and removal of the existing basketball court would be completed. Landscaping of the entire area with topsoil/seed would also be done. The proposed design appended to this report does not include any new fencing but does include for soccer field posts, gravel parking area, grading of the entire site, and construction of full size soccer field, tennis court and basketball court complete with required netting and baskets.

2. Estimated Construction Budget

The attached construction budget is an estimate based on grading of the entire park and completion of the items outlined in the proposed remediation design section above. The budget is based on utilizing on site materials for the grading of the property and the existing topsoil for landscaping. The budget is also for a surface drainage design as per the attached grading plan.

The high level budget is approximately $195,000 to complete everything that is being proposed. Please note that this includes 20% contingency allowance and is for full size basketball court which may not be necessary. Our budget is also based on typical contract rates for similar projects but local contractor's and the current market environment may allow for more competitive pricing.

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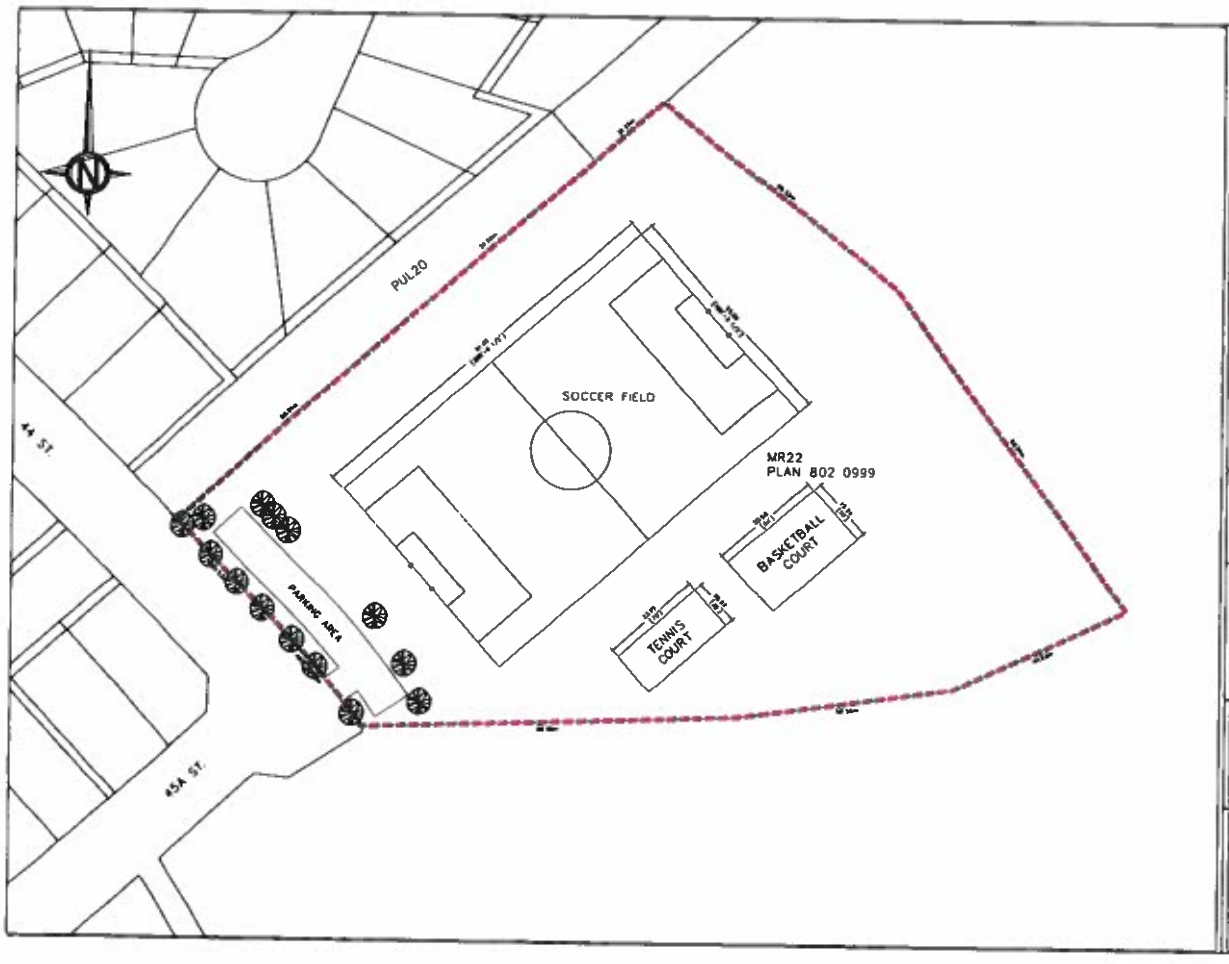
AND
ENVIRONMENTAL SERVICES

APPENDICES



PERMIT TO PRACTICE

ONOWAY, ALBERTA

BRETZLAFF PARK
REDEVELOPMENT

SITE PLAN

1:200

TOWN OF ONOWAY

BOLSON

9703 - 109 St
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110-1925

DD 110-1925-01

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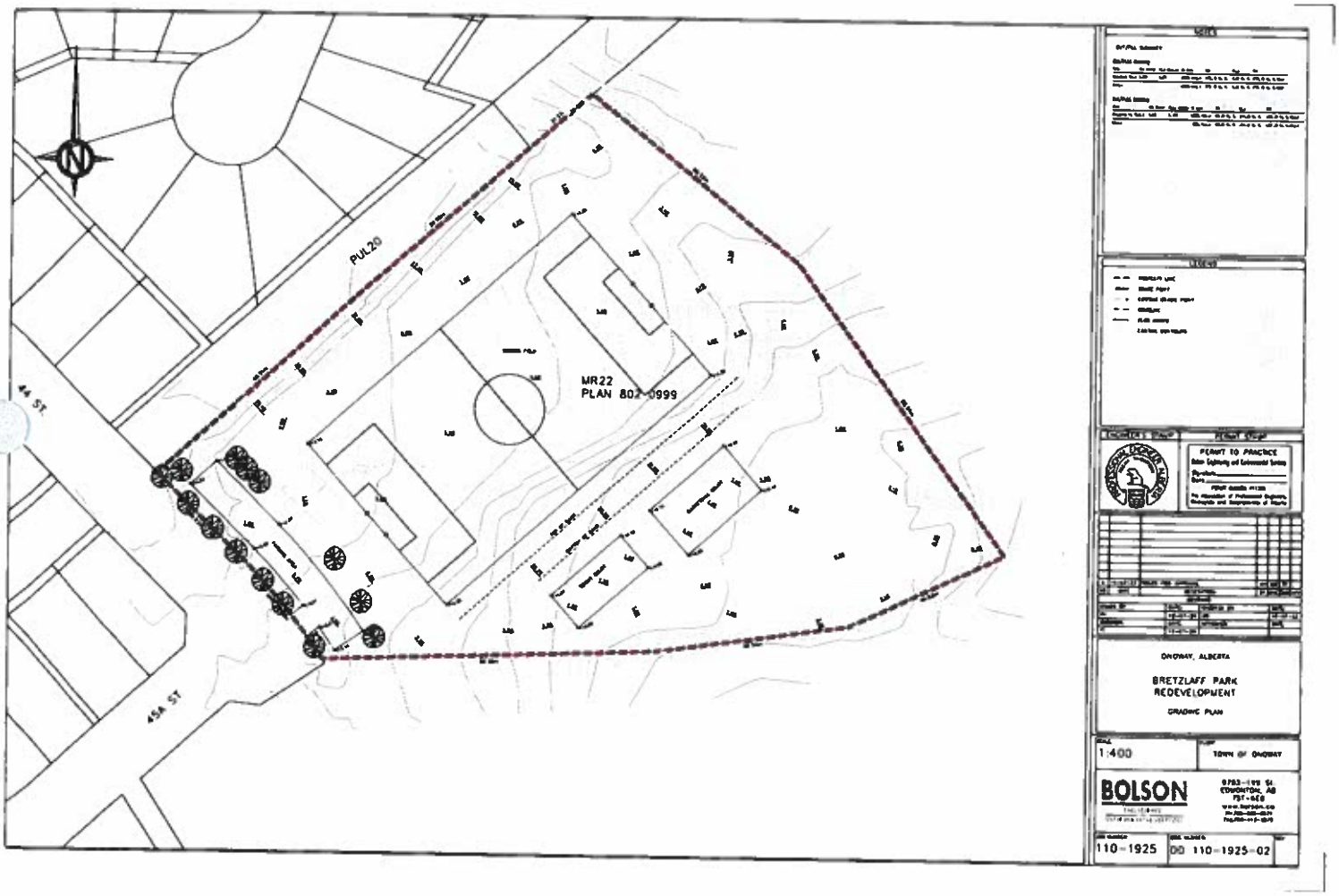
PUL20
MR22
PLAN 802 0999
44 ST
45A ST
PERMIT TO PRACTICE
ONOWAY, ALBERTA
BRETZLAFF PARK
REDEVELOPMENT
GRADING PLAN
1:400
TOWN OF ONOWAY
BOLSON
110-1925
DD 110-1925-02

Profile | Summary | .xls Export

Cost Summary

110-1925 - Bretzlaff Park Improvements

Town Of Onoway

Printed: July 31, 2019

Job		Baseline	Supplier	Comments
Earthworks	$	49,000.00		Stripping/Grading/Removals
Landscaping	$	26,000.00		Topsoil and Seed/Minor Plantings
Soccer Field	$	8,500.00		Goal Posts
Courts	$	38,000.00		Asphalt Tennis Court/Basketball Court
Gravel Parking Area	$	28,000.00		Compact and Place Granular (6") for Parking
Fencing	$	-		No Allowance
Engineering	$	14,950.00		10% of Construction
Contingency	$	29,900.00		20% of Construction
Totals	**$**	**194,350.00**		

Notes:

1. GST not included.
2. Budgetary summary based on conceptual design

BOLSON
ENGINEERING AND ENVIRONMENTAL SERVICES

49th AVENUE
NEIGHBOURHOOD IMPROVEMENTS

Prepared For:
Town of Onoway

Property Description:
49th Avenue Neighbourhood
Onoway, AB

Project Number:
17-D-017

ONOWAY
HUB OF THE HIGHWAYS

Rev.	Date	Description
B	*1-Dec-17*	Issued to Client
A	*27-Nov-17*	Issued for Internal Review

Prepared By:

PROFESSIONAL ENGINEER
TRENT THOMPSON
ALBERTA

Reviewed By:

PROFESSIONAL ENGINEER
MICHAEL BOLSON
ALBERTA

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BOLSON
ENGINEERING AND ENVIRONMENTAL SERVICES

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FIGURES:

Figure 1.0 – *LOCATION PLAN*

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DWG DD-17D017-01 – *PROPOSED CURB GRADES*
DWG DD-17D017-02 – *AS-BUILT CONTOURS*
CONSTRUCTION ESTIMATE

BOLSON
ENGINEERING AND ENVIRONMENTAL SERVICES

1. INTRODUCTION

1.1 PURPOSE

A review of the existing drainage in the 49th Avenue neighbourhood was conducted to determine exiting issues and possible remediation actions. This review was conducted by completing a walkthrough of the area, arranging for a topographical survey of the existing asphalt and concrete grades, conducting an analysis of the current drainage, and reviewing options for correcting any concerns. The results of our investigation are outlined below.

1.2 PLAN AREA

The 49th Avenue neighbourhood consists of the entire 49th Avenue road network from 52nd street west to the existing cul-de-sac. There are 27 lots situated in the neighbourhood as well as some MR and Park spaces. Approximately 365m of roadway complete with curb and gutter and sidewalks are constructed in the area with a total gross asphalt paved area of 5,100 m^2. Figure 1.0 – Location Plan outlines the area that was assessed.

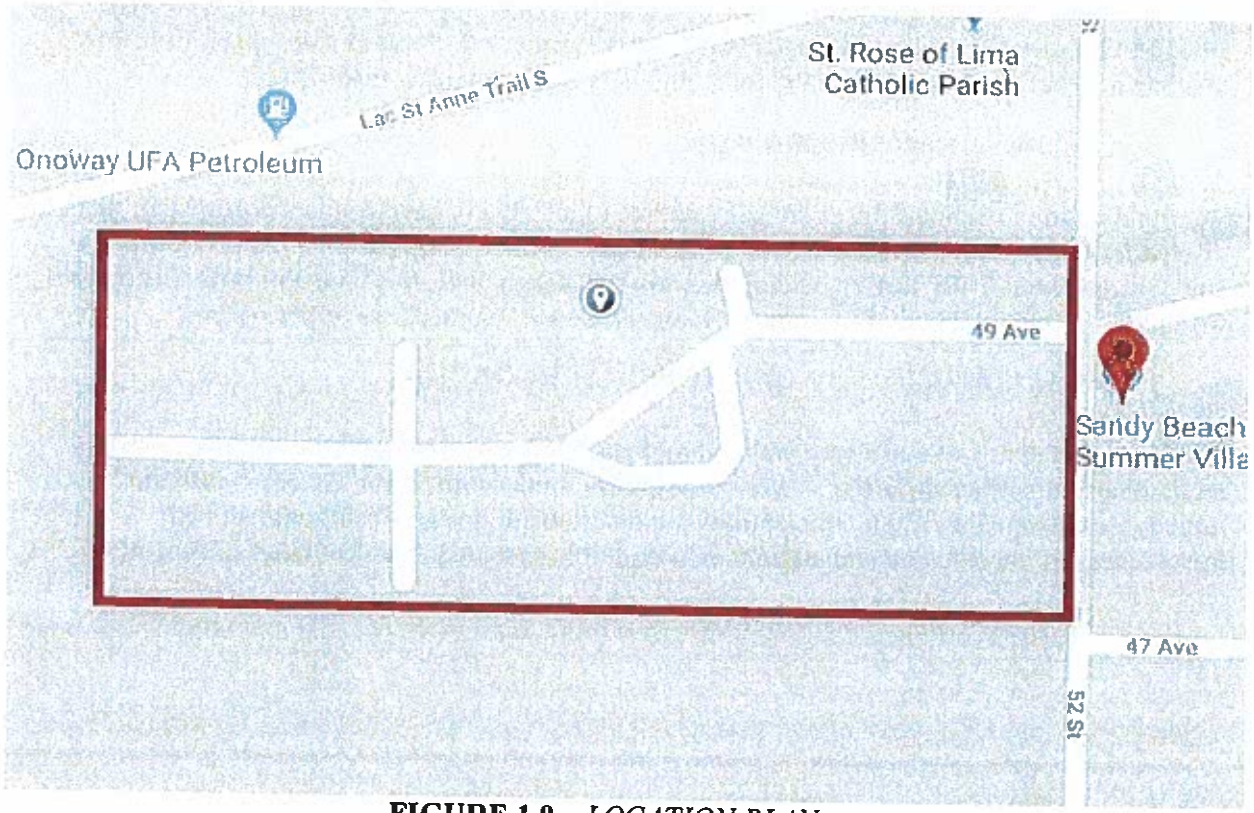

FIGURE 1.0 – *LOCATION PLAN*

1.3 CURRENT DRAINAGE CONCERNS

Currently there is very poor drainage within the neighbourhood. The original design and intent of construction was for all the water that drains to the roadways to travel overland through the curb and gutter system and discharge at the 2 existing culverts located between Lots 21A and 1. However, over the years rehabilitation work, settlement, and typical wear and tear of the roadway and concrete infrastructure has resulted in the drainage being compromised. In several areas water is not able to drain as designed and instead ponds and backs up in various areas of the street and/or properties rather than flowing away to the designed outlets.

2. PROPOSED DESIGN OPTIONS

2.1 SURFACE DRAINAGE

To rectify the drainage issues, rehabilitation of the concrete and roadway structures could be completed. This would involve removing the existing concrete curbs and gutters throughout the entire neighbourhood as well as the asphalt paved roadway and concrete swales. New curbs, gutters, swales, and roadways would then be installed to the proposed design grades to ensure adequate drainage throughout the neighbourhood. A review of the survey design grades shows that this option is feasible and would not require any underground infrastructure.

2.2 UNDERGROUND DRAINAGE

A second option to address the drainage would be to install an underground storm system that discharges to the ditch at the south side of the neighbourhood. Significant amounts of asphalt and concrete would still need to be removed and reinstalled and some concerns with this option would be the limited depth of the storm sewers and future maintenance of the system.

2.3 COMBINATION OF SURFACE/UNDERGROUND

A third option that was considered was a combination of remediating sections of the concrete and asphalt for surface drainage as well as installing some storm sewer system to provide underground drainage. Again, this option would still result in significant removal and replacement of the concrete and asphalt areas and may pose maintenance issues in the future.

3. RECOMMENDATIONS AND CONCLUSIONS

After a thorough review of the existing infrastructure, as-built grades, and possible design options, it is our opinion that the most cost efficient and effective method to correct the existing drainage concerns is to do a full removal and reinstallation of the concrete and asphalt. It is not recommended to incorporate underground infrastructure.

The proposed construction methodology would be to do the neighbourhood in Phases. Each phase would consist of removing the existing concrete and asphalt, and reinstalling with proper subbase and gravel and to the proposed design grades. This would involve some rehabilitation work as well on the existing walkways, driveways, and yards to ensure the existing grades match seamlessly with the new grades. By completing this work, the area would drain property to the discharge points between Lots 21A and 1.

A construction budget is appended to this report for your reference. Doing this rehabilitation work is a significant undertaking, but it is the only reasonable option to correct all the drainage deficiencies. The work could be split up into Phases and spread out over several years if necessary, although the most cost-effective method would be to complete everything at the same time.

If this is something that the Town would like to consider moving forward with, our recommendation is to get approval to complete a full design and tender package for pricing in the early spring. The work could be priced as a complete package with the option to split into Phases and spread out over a few years. The entire design however would need to be completed at once to ensure all areas are addressed and the storm water management calculations include the entire neighbourhood. Bolson Engineering can provide a quotation to complete the entire design and tender package if requested.

Please find attached to this report the as-built contour drawing of the neighbourhood, a general proposed curb grading plan showing the drainage slopes that can be achieved with overland rehabilitation, and a summary of the design and construction budget for this project.

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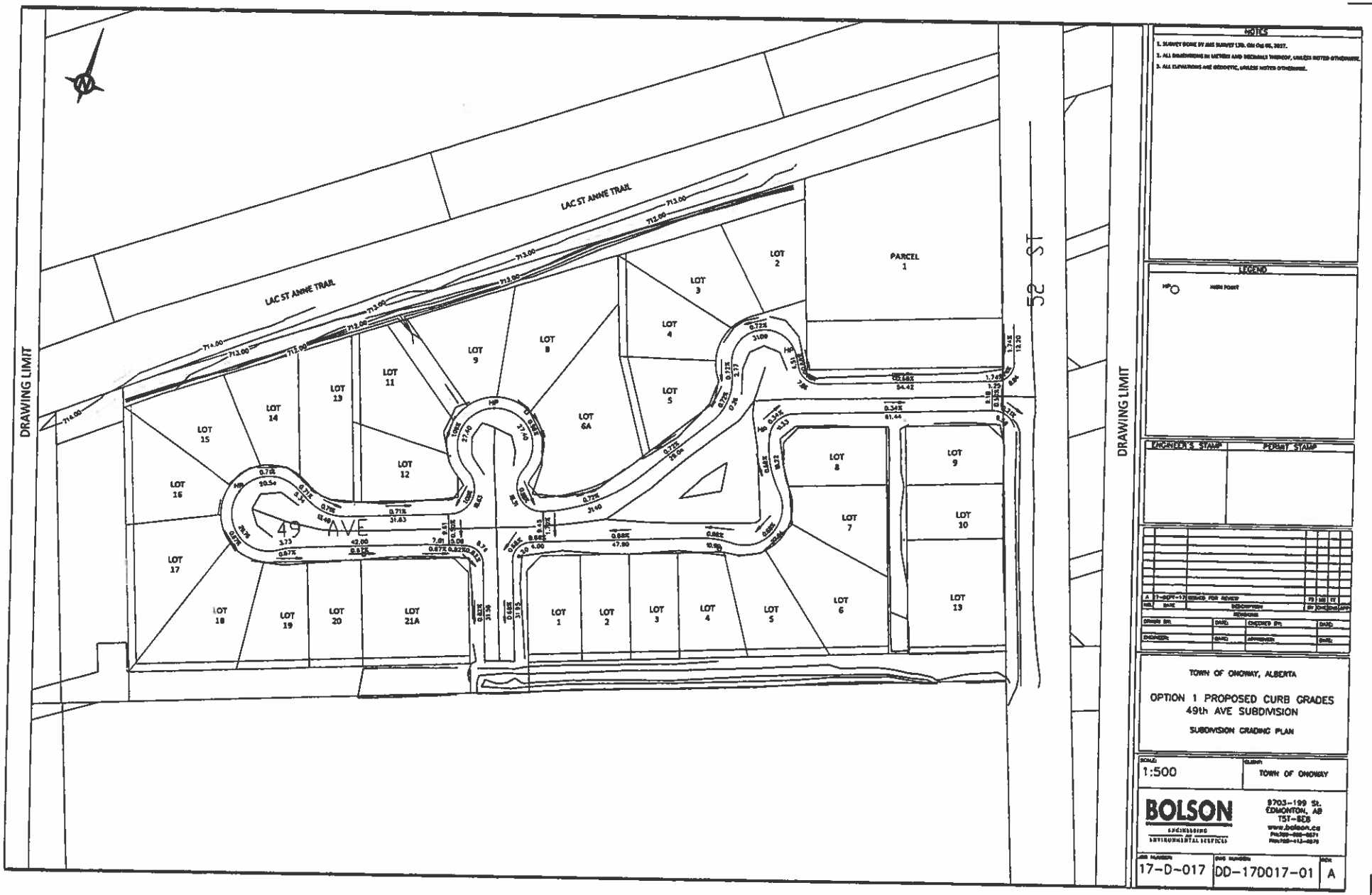
ENGINEERING AND ENVIRONMENTAL SERVICES

APPENDICES



NOTES

1. SURVEY DONE BY AXIS SURVEY LTD. ON Oct 05, 2017.
2. ALL DIMENSIONS IN METERS AND DECIMALS THEREOF, UNLESS NOTED OTHERWISE.
3. ALL ELEVATIONS ARE GEODETIC, UNLESS NOTED OTHERWISE.

LEGEND

HP — HUB POINT

ENGINEER'S STAMP | PERMIT STAMP

NO.	DATE	DESCRIPTION	BY	CHECKED	APP'D
A	17-OCT-17	ISSUED FOR REVIEW			

DRAWN BY:	DATE:	CHECKED BY:	DATE:
ENGINEER:	DATE:	APPROVED:	DATE:

TOWN OF ONOWAY, ALBERTA

OPTION 1 PROPOSED CURB GRADES
49th AVE SUBDIVISION

SUBDIVISION GRADING PLAN

SCALE:	CLIENT:
1:500	TOWN OF ONOWAY

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JOB NUMBER	DWG NUMBER	REV.
17-D-017	DD-17D017-01	A

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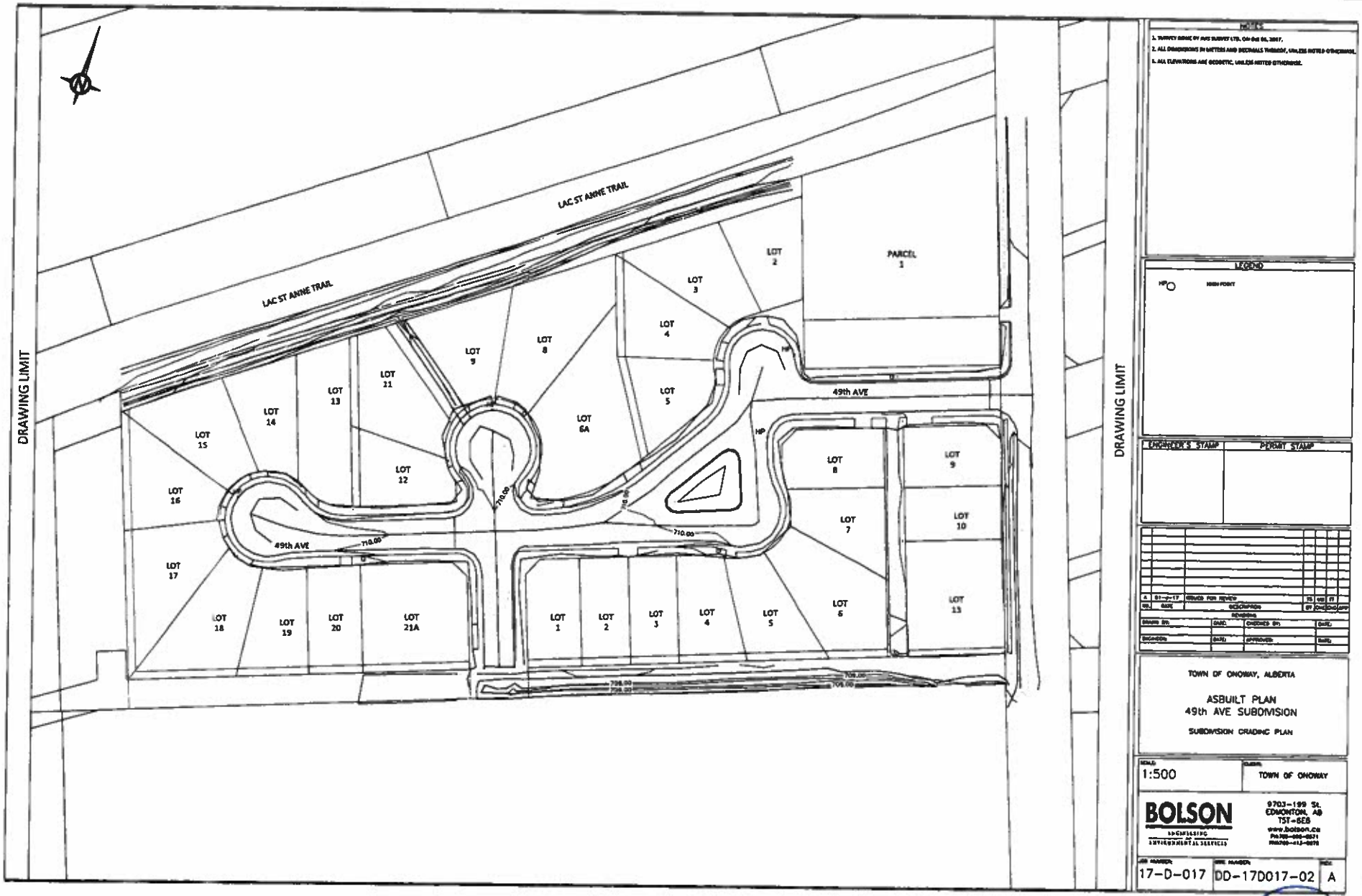

NOTES

1. SURVEY DONE BY AVC SURVEY LTD. ON Oct 06, 2017.
2. ALL DIMENSIONS IN METERS AND DECIMALS THEREOF, UNLESS NOTED OTHERWISE.
3. ALL ELEVATIONS ARE GEODETIC, UNLESS NOTED OTHERWISE.

LEGEND

HP HIGH POINT

ENGINEER'S STAMP

PERMIT STAMP

NO.	DATE	DESCRIPTION	BY
A	01-Jun-17	ISSUED FOR REVIEW	

DRAWN BY:	DATE:	CHECKED BY:	DATE:
ENGINEER:	DATE:	APPROVED:	DATE:

TOWN OF ONOWAY, ALBERTA

ASBUILT PLAN
49th AVE SUBDIVISION

SUBDIVISION GRADING PLAN

SCALE:	CLIENT:
1:500	TOWN OF ONOWAY

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9703-159 St.
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T5T-6E8
www.bolson.ca
PH: 780-486-8571
FAX: 780-413-8578

JOB NUMBER:	DWG NUMBER:	REV:
17-D-017	DD-17D017-02	A

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BOLSON
ENGINEERING AND ENVIRONMENTAL SERVICES

project tracker v2.0

Job #:	17-D-017	Job Type:	Improvements
Project:	49 Avenue Neighbourhood Improvements	Job Location:	Onoway
Client:	Town Of Onoway		
Project Manager:	Trevor Shinness		
Date Created:	23-Nov-17		30-Nov-17

COST BREAKDOWN

Cost Summary	Units	Baseline Phase			
Total Cost		$ 1,234,350.00			
# of Lots	#	27			
Gross Area	m^2	5,100			
	Ha	0.51			
	Ac	1.26			
Length of Road	ft	1,198			
	m	365			
Frontage	ft				
	m				
Cost / Lot	$/Lot	$ 45,716.67			
Cost / Gross Area	$/$m^2$	$ 242.03			
	$/Ha	$ 2,420,294.12			
	$/Ac	$ 979,458.28			
Cost / Road Length	$/ft	$ 1,030.72			
	$/m	$ 3,381.78			
Cost / Frontage Length	$/ft				
	$/m				

Profile | Summary | .xls Export

Cost Summary

17-D-017 - 49 Avenue Neighbourhood Improvements

Town Of Onoway

Printed: December 19, 2017

Job		Baseline	Supplier	Comments
Earthworks	$	-		N/A
Undergrounds	$	-		N/A
Roadways	$	669,000.00		Remove and Replace Asphalt Roadway
Concrete	$	357,000.00		Sidewalk/Curb and Gutter/Swales/Driveways
Gas	$	-		No Allowance
Fencing	$	-		No Allowance
Landscaping	$	29,000.00		Topsoil and Sod along Boulevard and Back of Curbs
Engineering	$	73,850.00		7% of Construction
Contingency	$	105,500.00		10% of Construction
Totals	**$**	**1,234,350.00**		

Notes:

1. GST not included.
2. Budgetary summary based on conceptual design

Associated Engineering | GLOBAL PERSPECTIVE LOCAL FOCUS.

Associated Engineering Alberta Ltd.
500, 9888 Jasper Avenue
Edmonton, Alberta, Canada, T5J 5C6

TEL: 780.451.7666
FAX: 780.454.7698
www.ae.ca

September 28, 2020
File: 2020-3892

Jason Madge
Assistant CAO/ Public Works Manager
Town of Onoway
4812 - 51 Street Box 540
Onoway, AB
T0E 1V0

Re: ONOWAY INFRASTRUCTURE ADVISORY
PRELIMINARY COST ESTIMATES

Dear Jason:

Please find the attached preliminary cost estimate for the nine (9) project locations identified during the site visit on August 24th. Concerns and conceptual solutions were identified during the site visit and are included on the attached figures and costs estimates.

Unit pricing received on other recent projects in the area, as well as an understanding of the market for similar projects, has been used in estimating the unit prices. Quantities are based on aerial photos and will be further confirmed during detailed design. A summary of the cost estimates for each location is provided in Table 1. A detailed cost breakdown and figures identifying the scope of work for each project location are attached.

An engineering budget of 15% is included and includes engineering, topographic survey and geotechnical investigation. An overall contingency allowance of 25% has been included in the cost estimate to account for undetermined costs and scope items that have not been fully established and will be further confirmed in detailed design.

A Carbon Neutral Company

BEST MANAGED COMPANIES

Table 1: Summary: Preliminary Cost Estimates

Location	Total with Engineering (15%) and Contingency (25%)
1 - 49 AVE WEST OF 52 ST	$2,820,000
2 - 48 AVE (50-51 ST) AND CONNECTION TO 49 AVE	$1,020,000
3 - 48 ST (47 AVE - LAC STE ANNE TRAIL)	$2,290,000
4 - 50 AVE (EAST OF 49 ST)	$760,000
5 - 51 AVE WEST 49 ST	$500,000
6 - 53 AVE/ 49 ST (50 ST - LAC ST ANNE TRAIL)	$690,000
7 - 47A/ AVE MILLER DRIVE (44 ST - PAYNE AVE)	$1,110,000
8 - ALLEY (51 ST - 50 ST / LAC STE ANNE TRAIL - 49 AVE)	$370,000
9 - LAC STE ANNE TRAIL (49 ST - APARTMENTS)	$2,140,000
TOTAL LOCATION COSTS=	$9,560,000

1,700,000 ✓

Combining various project locations, and therefore a single tender document, will potentially reduce costs. Engineering, currently estimated at 15% of construction cost, may reduce with efficiencies in geotechnical investigation, topographic survey, tender, and construction administration. Mobilization and demobilization of the contractor, currently estimated as $60,000 per location, may also reduce as project locations are combined.

Yours truly,

PROFESSIONAL ENGINEER ALBERTA CARLIE PITTMAN
2020-09-28

Carlie Pittman, P.Eng.
Project Engineer

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
Signature
2020-09-30
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta

cc: Graham Sterparn Associated Engineering
Attachments: Detailed Preliminary Cost Estimate
Figures of Project Locations

Associated Engineering

Project
ONOWAY INFRASTRUCTURE ADVISORY

Subject
Locations 1-9: Preliminary Cost Estimates

Proj No. 2020-3892

By: Carlie Pittman, P.Eng

Item	Description	Unit	Quantity	Unit Price	Extension
1.0	LOCATION 1 - 49 AVE WEST OF 52 ST (SHAUL)				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure Including Asphalt	m2	5300	$50	$265,000
	Remove and Dispose Concrete Curb and Gutter	m	140	$100	$14,000
	Remove and Dispose Concrete Sidewalk	m	590	$150	$88,500
	Remove and Replace Hydrant or Add New	ea	1	$20,000	$20,000
	Remove and Replace Valves	ea	3	$15,000	$45,000
	Supply and Install Storm Sewer	m	385	$1,000	$385,000
	Supply and Install Catch Basin Lead	m	90	$520	$46,800
	Supply and Install Manholes	vm	15	$2,500	$37,500
	Supply and Install Catch Basin	ea	9	$2,500	$22,500
	Supply and Install 300mm Granular Base	m2	5300	$50	$265,000
	Supply and Install 65mm Hot Mix Asphalt	m2	5300	$70	$371,000
	Supplied and Installed Road Face Curb and Gutter	m	140	$250	$35,000
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	590	$500	$295,000
TOTAL LOCATION 1 - 49 AVE WEST OF 52 ST					$1,980,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$294,000
	TOTAL w/ 26% Contingency				$2,820,000
2.0	LOCATION 2 - 48 AVE (50-51 ST) AND CONNECTION TO 49 AVE				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure Including Asphalt	m2	2900	$50	$145,000
	Remove and Dispose Concrete Sidewalk	m	300	$150	$45,000
	Supply and Install 300mm Granular Base	m2	2900	$50	$145,000
	Supply and Install 65mm Hot Mix Asphalt	m2	1900	$70	$133,000
	Supplied and Installed Road Face Curb and Gutter	m	90	$250	$22,500
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	300	$500	$150,000
TOTAL LOCATION 2 - 48 AVE (50-51 ST) AND CONNECTION TO 49 AVE					$710,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$106,500
	TOTAL w/ 26% Contingency				$1,020,000

Prior #1

105K

491,800

556,800

-2,263,20

228

Associated Engineering

Project
ONOWAY INFRASTRUCTURE ADVISORY

Subject
Locations 1-9: Preliminary Cost Estimates

Proj No. 2020-3892

By: Carlie Pittman, P.Eng

Item	Description	Unit	Quantity	Unit Price	Extension
3.0	**LOCATION 3 - 48 ST (47 AVE - LAC STE ANNE TRAIL)**				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure including Asphalt	m2	5400	$50	$270,000
	Remove and Dispose Concrete Curb and Gutter	m	550	$100	$55,000
	Remove and Dispose Concrete Sidewalk	m	320	$150	$48,000
	Supply and Install Storm Sewer (or Culvert)	m	150	$1,000	$150,000
	Supply and Install Catch Basin Lead	m	70	$520	$36,400
	Supply and Install Manholes	vm	6	$2,500	$15,000
	Supply and Install Catch Basin	ea	3	$2,500	$7,500
	Supply and Instal 300mm Granular Base	m2	5400	$50	$270,000
	Supply and Install 65mm Hot Mix Asphalt	m2	5400	$70	$378,000
	Supply and Installed Road Face Curb and Gutter	m	550	$250	$137,500
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	300	$500	$150,000
	Ditch Improvement	m	40	$100	$4,000
	TOTAL LOCATION 3 - 48 ST (47 AVE - LAC STE ANNE TRAIL)				$1,590,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$238,500
	TOTAL w/ 25% Contingency				$2,290,000
4.0	**LOCATION 4 - 50 AVE (EAST OF 49 ST)** (East of Yellow Canada)				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure no Asphalt	m2	3000	$25	$75,000
	Supply and Install Storm Sewer (Culvert)	m	10	$1,000	$10,000
	Supply and Instal 300mm Granular Base	m2	3000	$50	$150,000
	Supply and Install 65mm Hot Mix Asphalt	m2	3000	$70	$210,000
	Ditch Improvement	m	120	$100	$12,000
	TOTAL LOCATION 4 - 50 AVE (EAST OF 49 ST)				$530,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$79,500
	TOTAL w/ 25% Contingency				$760,000
8.0	**LOCATION 8 - 51 AVE WEST 49 ST** (W of Museum)				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure no Asphalt	m2	1300	$25	$32,500
	Remove and Dispose Concrete Sidewalk	m	90	$150	$13,500
	Supply and Install Storm Sewer (Culvert)	m	10	$1,000	$10,000
	Supply and Instal 300mm Granular Base	m2	1300	$50	$65,000
	Supply and Install 65mm Hot Mix Asphalt	m2	1300	$70	$91,000
	Supply and Installed Road Face Curb and Gutter	m	90	$250	$22,500
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	90	$500	$45,000
	TOTAL LOCATION 8 - 51 AVE WEST 49 ST				$350,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$52,500
	TOTAL w/ 25% Contingency				$500,000

Prior #3B

Prior #3

229

Associated Engineering

Project: ONOWAY INFRASTRUCTURE ADVISORY

Subject: Locations 1-9: Preliminary Cost Estimates

Proj No: 2020-3892

By: Carlie Pittman, P.Eng

Item	Description	Unit	Quantity	Unit Price	Extension
6.0	**LOCATION 6 - 53 AVE/ 49 ST (50 ST - LAC ST ANNE TRAIL)**				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure including Asphalt	m2	2200	$50	$110,000
	Remove and Dispose Concrete Sidewalk	m	20	$150	$3,000
	Supply and Install Storm Sewer (Culvert)	m	20	$1,000	$20,000
	Supply and Install 300mm Granular Base	m2	2200	$50	$110,000
	Supply and Install 65mm Hot Mix Asphalt	m2	2200	$70	$154,000
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	20	$500	$10,000
	Ditch Improvement	m	20	$100	$2,000
TOTAL LOCATION 6 - 53 AVE/ 49 ST (50 ST - LAC ST ANNE TRAIL)					$480,000
	Engineering (15%) including Geotechnical Investigation and Topographic Survey				$72,000
	TOTAL w/ 25% Contingency				$690,000
7.0	**LOCATION 7 - 47A/ AVE MILLER DRIVE (44 ST - PAYNE AVE)**				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure including Asphalt	m2	2300	$50	$115,000
	Remove and Dispose Concrete Curb and Gutter	m	215	$100	$21,500
	Remove and Dispose Concrete Sidewalk	m	230	$150	$34,500
	Remove and Replace Hydrant or Add New	ea	2	$20,000	$40,000
	Remove and Replace Valves	ea	3	$15,000	$45,000
	Supply and Install 300mm Granular Base	m2	2300	$50	$115,000
	Supply and Install 65mm Hot Mix Asphalt	m2	2300	$70	$161,000
	Supply and Installed Road Face Curb and Gutter	m	215	$250	$53,750
	Supply and Install Monolithic Sidewalk Rolled Face Curb and Gutter	m	230	$500	$115,000
TOTAL LOCATION 7 - 47A/ AVE MILLER DRIVE (44 ST - PAYNE AVE)					$770,000
	Engineering (15%) including Geotechnical Investigation and Topographic Survey				$115,500
	TOTAL w/ 25% Contingency				$1,110,000
8.0	**LOCATION 8 - ALLEY (51 ST - 50 ST / LAC STE ANNE TRAIL - 49 AVE)** (Glass shop)				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure no Asphalt	m2	870	$25	$21,750
	Supply and Install Storm Sewer	m	55	$1,000	$55,000
	Supply and Install Manholes	vm	3	$2,500	$7,500
	Supply and Install 300mm Granular Base	m2	870	$50	$43,500
	Supply and Install 65mm Hot Mix Asphalt	m2	870	$70	$60,900
TOTAL LOCATION 8 - ALLEY (51 ST - 50 ST / LAC STE ANNE TRAIL - 49 AVE)					$260,000
	Engineering (15%) including Geotechnical Investigation and Topographic Survey				$39,000
	TOTAL w/ 25% Contingency				$370,000

62,500

307,500

230

Associated Engineering

Project
ONOWAY INFRASTRUCTURE ADVISORY

Subject
Locations 1-9: Preliminary Cost Estimates

Proj No. 2020-3892

By: Carlie Pittman, P.Eng

Item	Description	Unit	Quantity	Unit Price	Extension
9.0	LOCATION 9 - LAC STE ANNE TRAIL (49 ST - APARTMENTS)				
	Mobilization and Demobilization	LS	1	$60,000	$60,000
	Survey Layout	LS	1	$10,000	$10,000
	Remove and Dispose Road Structure Including Asphalt	m2	4480	$50	$224,000
	Supply and Install Storm Sewer Sanitary	m	640	$1,000	$640,000
	Supply and Install Manholes	vm	9	$2,500	$22,500
	Supply and Install 300mm Granular Base	m2	4480	$50	$224,000
	Supply and Install 65mm Hot Mix Asphalt	m2	4480	$70	$313,600
TOTAL LOCATION 9 - LAC STE ANNE TRAIL (49 ST - APARTMENTS)					$1,490,000
	Engineering (15%) Including Geotechnical Investigation and Topographic Survey				$223,500
	TOTAL w/ 25% Contingency				$2,140,000

Assumptions:
- 1200mm manhole depths of 3m each
- Road Structure 300mm Base with 65mm Hot Mix Asphalt
- Quantity of Hydrant and Valves to be confirmed
- Sanitary Sewer Lengths and Manhole/Catch basin Quantities to be Confirmed in Detailed Design

FIGURE 1

CHOWAN INFRASTRUCTURE ADVISORY

PROJECT LOCATIONS

AE PROJECT No.	
SCALE	
APPROVED	
DATE	
REV	
DESCRIPTION	ISSUED FOR PRELIMINARY COST ESTIMATE

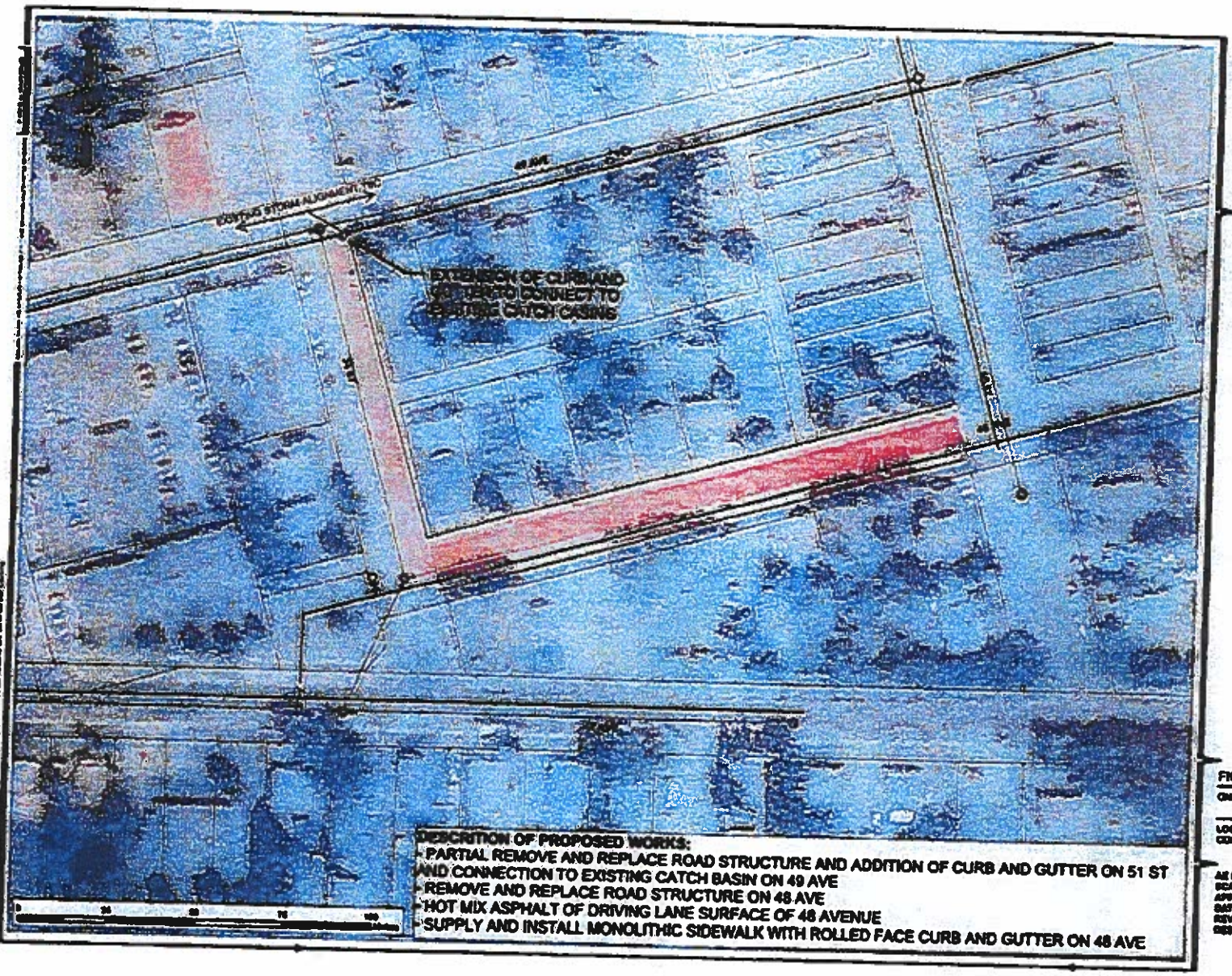
232

FIGURE 2

LOCATION 1 / 49 AVE WEST OF 52 ST

AE PROJECT No.
SCALE
APPROVED
DATE
REV
DESCRIPTION

ISSUED FOR PRELIMINARY COST ESTIMATE



Legend

- Existing Storm
- Existing Sanitary
- Existing Water
- Proposed Surface Works

FIGURE 3

CHOWKY INFASTRUCTURE ADVISORY

LOCATION 2 - 48 AVE (50-51 ST) AND CONNECTION TO 49 AVE

AE PROJECT No.	3330-3002
SCALE	1:1,000
APPROVED	
DATE	2020SEP24
REV	
DESCRIPTION	ISSUED FOR PRELIMINARY COST

234

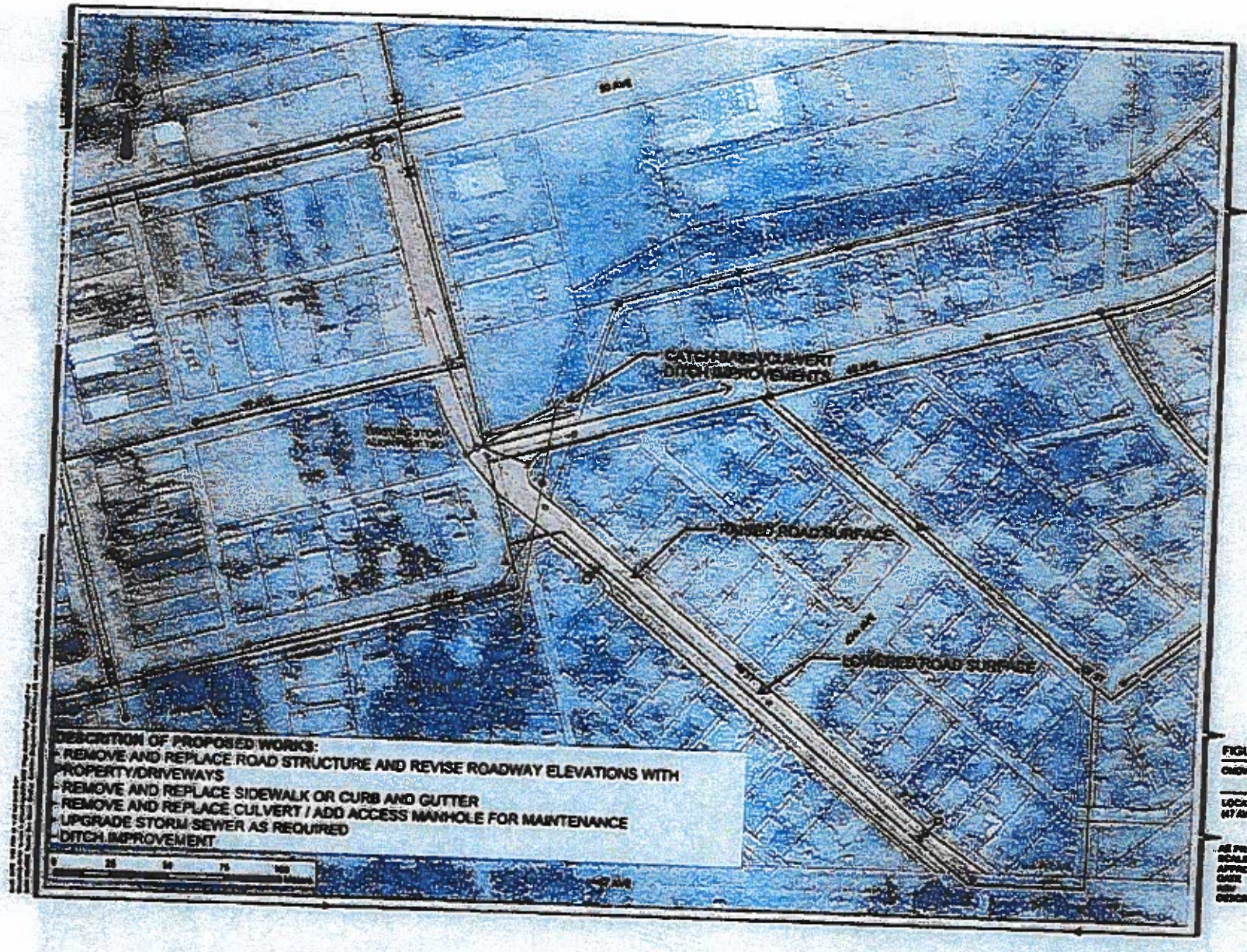


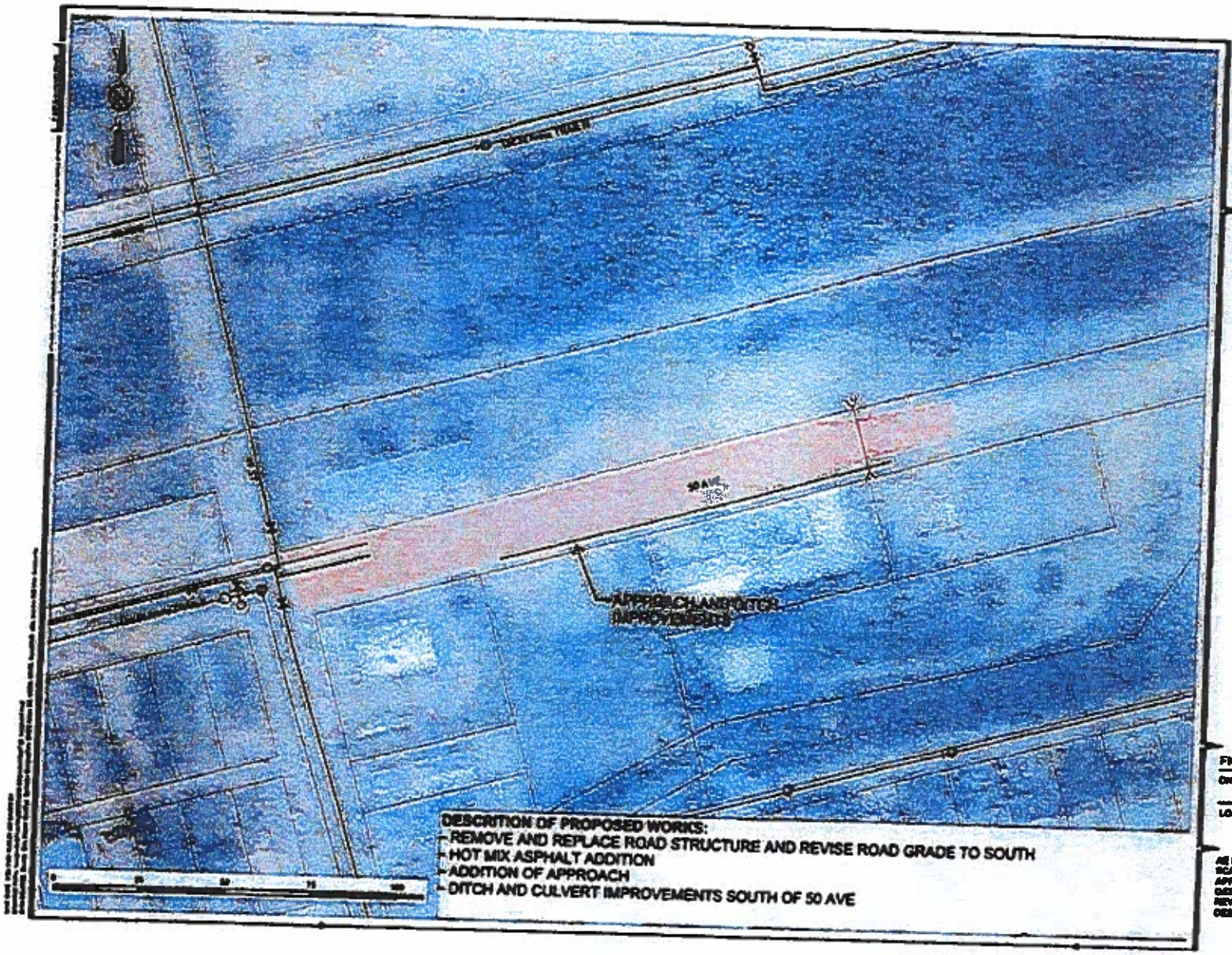
FIGURE 4

OVERWAY INFRASTRUCTURE ADVISORY

LOCATION 3 - 49 ST (47 AVE - LAC STE ANNE TRAIL)

AE PROJECT No. 2020-3802
SCALE 1:1,500
APPROVED
DATE 2020SEP24
DESCRIPTION ISSUED FOR PRELIMINARY COST ESTIMATE

235



Legend

- Existing Storm
- Existing Sanitary
- Existing Water

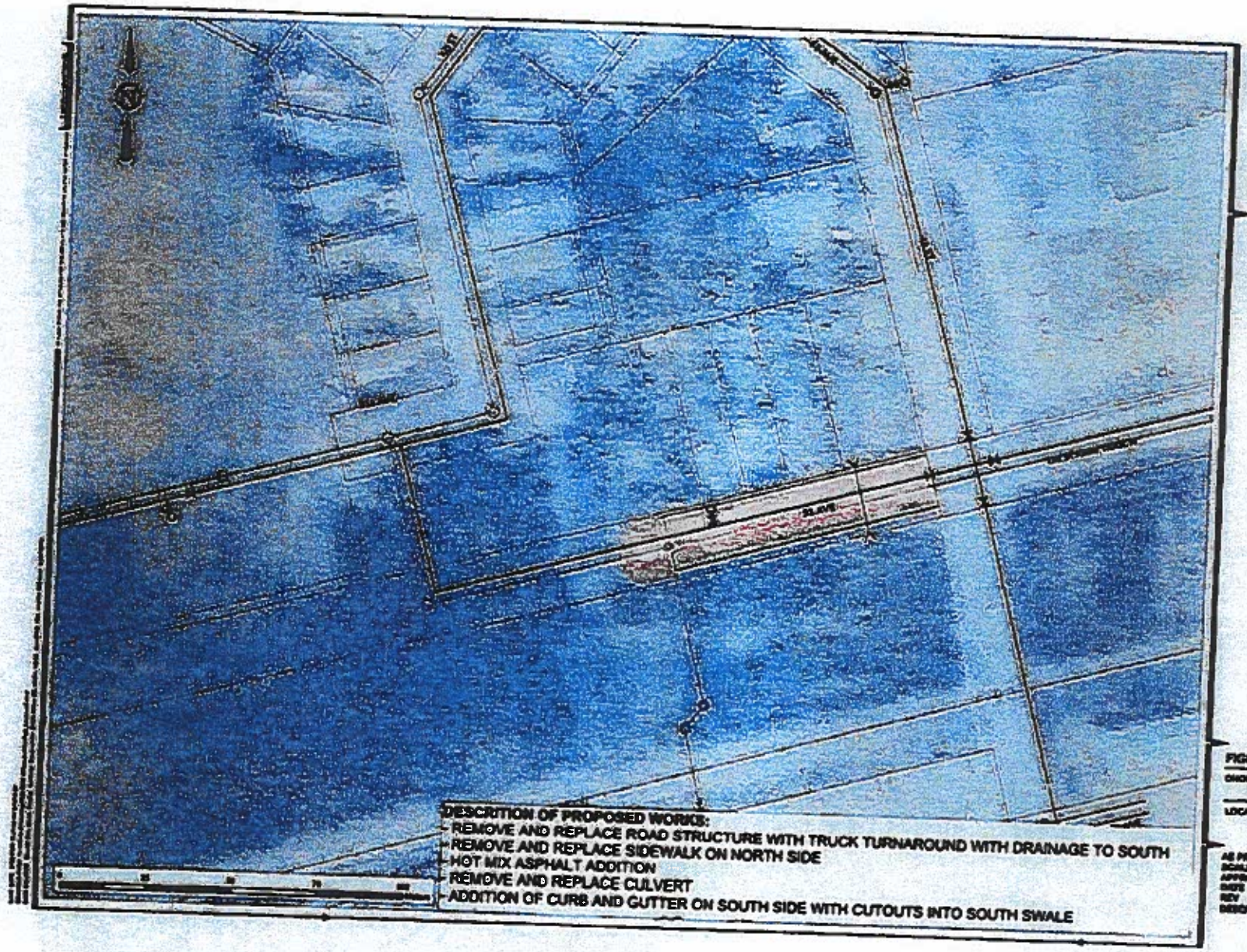
Proposed Surface Works

FIGURE 5

LOCATION 4 - 50 AVE (EAST OF 48 ST)

AE PROJECT No.
SCALE
APPROVED
DATE
REV
DESCRIPTION

235



Legend

- Existing Storm
- Existing Sanitary
- Existing Water
- Proposed Surface Works

FIGURE 6

LOCATION 5 - 54 AVE WEST 49 ST

AE PROJECT No.
SCALE 1:1,000
APPROVED
DATE
REV
DESCRIPTION ISSUED FOR PRELIMINARY COST ESTIMATE

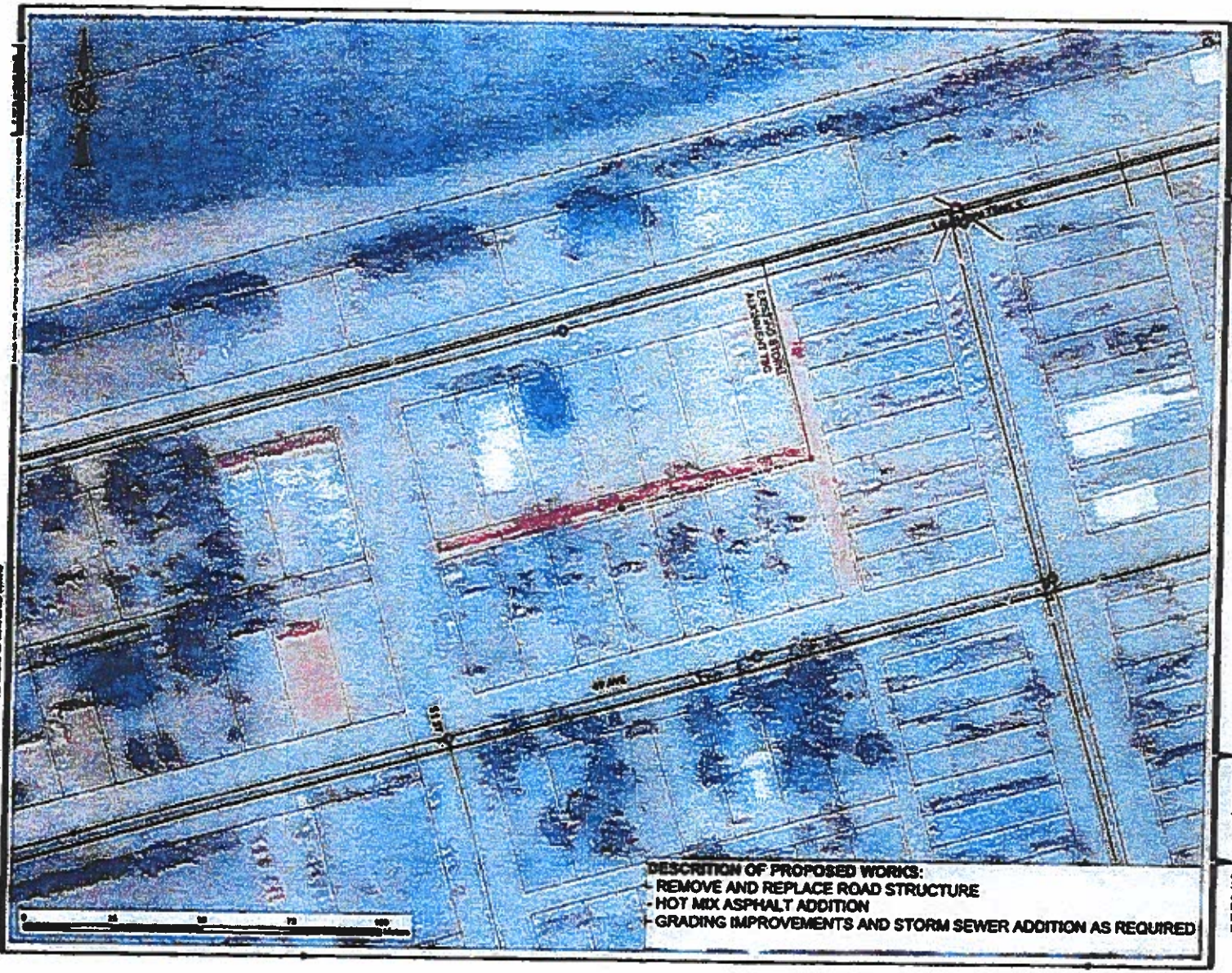
237


DESCRITION OF PROPOSED WORKS:
- REMOVE AND REPLACE ROAD STRUCTURE
- DITCH IMPROVEMENTS
- REMOVE AND REPLACE CULVERT(S)
DITCH AND CULVERT IMPROVEMENTS
Legend
Existing Storm
Existing Sanitary
Existing Water
Proposed Surface Works
FIGURE 7
LOCATION 6 - 53 AVE/ 49 ST
(50 ST - LAC ST ANNE TRAIL)
AE PROJECT No.
SCALE
APPROVED
DATE
REV
DESCRIPTION
ISSUED FOR PRELIMINARY COST ESTIMATE

538


Legend
Existing Storm
Existing Sanitary
Existing Water
Proposed Surface Works
DESCRITION OF PROPOSED WORKS:
- REMOVE AND REPLACE ROAD STRUCTURE
- REMOVE AND REPLACE SIDEWALK OR CURB AND GUTTERS
- REMOVE AND REPLACE WATERLINE VALVES
FIGURE 8
AE PROJECT No.
SCALE
APPROVED
DATE
REV
DESCRIPTION
ISSUED FOR PRELIMINARY COST ESTIMATE

239



Associated Engineering

Legend

- Existing Storm
- Existing Sanitary
- Existing Water
- Proposed Surface Works
- Proposed Storm (TBC in Detailed Design)

DESCRIPTION OF PROPOSED WORKS:

- REMOVE AND REPLACE ROAD STRUCTURE
- HOT MIX ASPHALT ADDITION
- GRADING IMPROVEMENTS AND STORM SEWER ADDITION AS REQUIRED

FIGURE 9

CROWN INFRASTRUCTURE ADVISORY

LOCATION 8 - ALLEY (51 ST - 50 ST / LAC STE ANNE TRAIL - 49 AVE)

AE PROJECT No.	3230-0002
SCALE	1:1,000
APPROVED	
DATE	2024/SEP/24
REV	
DESCRIPTION	ISSUED FOR PRELIMINARY COST ESTIMATE

240

FIGURE 10

ONGOING INFRASTRUCTURE ADVISORY

LOCATION 9 - LAC STE ANNE TRAIL
149 ST - APARTMENTS

AE PROJECT No.	2020-3660
SCALE	1:1,250
APPROVED	
DATE	2020SEP24
REV	
DESCRIPTION	ISSUED FOR PRELIMINARY COST ESTIMATE

241

2021 Proposed Capital Road Projects

Priority #	Description/ Location	Cost Estimate
1	Shaul Subdivision (49ave west of 52st) Road/ drainage rehab	2.8 million
2	Lac Ste Anne Trail North (east of 49st to the apartments) Sewer replacement and road rehab	2.1 million
3a	51ave west of 49st (Bourke's street) Road/ drainage rehab	500k
3b	50ave east of 49st (east of Petro Canada) Road/ drainage rehab	760k

MEMORANDUM OF AGREEMENT entered into effective this 1st day of January, 2022

BETWEEN:

LAC STE. ANNE COUNTY
(hereinafter referred to as the "County")

- and -

TOWN OF ONOWAY
(hereinafter referred to as the "Town")

RECREATION FUNDING AGREEMENT

WHEREAS the County provides funding to recreation facilities within their municipal boundaries and/or within the region;

WHEREAS the County and the Town have entered into an Intermunicipal Collaboration Framework agreement pursuant to the *Municipal Government Act* ("ICF"), and as part of that ICF intend that any agreement with respect to recreation services will be dealt with through a separate agreement;

AND WHEREAS the County and the Town wish to set out their agreement with respect to shared funding for recreation services, on the terms and subject to the conditions hereinafter set forth.

NOW THEREFORE THIS AGREEMENT WITNESSETH that the parties hereto in consideration of the mutual covenants and agreements hereinafter set forth covenant and agree with each other as follows:

1. This Agreement shall be effective for a term starting January 1, 2022, and ending December 31, 2025. It may be renewed or extended by mutual agreement of the parties.

2. The County agrees to contribute to the recreation facilities identified in Schedule "A" to the extent of the amounts described in Schedule "A" to this Agreement. Such payments shall represent the County's full and complete obligation to contribute to recreation services as addressed by the ICF.

3. The County shall be responsible for coordinating payments to any third party organizations described in Schedule "A". The County shall have discretion over the timing of payments, provided that the County shall contribute at least the amounts set out in Schedule "A" during each calendar year of the term.

4. Notwithstanding the County's commitment to funding as set out in Schedule "A", the payments are subject to the County's policies and procedures for grant funding including with respect to any obligations by the recipients of those funding to provide recognition to the County for their contributions.

5. Upon request by either party, both parties agree to meet annually to review the contributions set out in Schedule "A".

6. Nothing herein or the contribution of funds by either party shall make such party liable or responsible for any losses, costs, demands or actions of any kind associated with the facilities or activities related to the funding provided by each municipality. Accordingly:

   a. The Town indemnifies and holds harmless the County from any actions, damages, losses, demands or costs (including legal costs on a solicitor and his own client basis) arising from any negligence or wrongful actions of the Town or its employees; and

   b. The County indemnifies and holds harmless the Town from any actions, damages, losses, demands or costs (including legal costs on a solicitor and his own client basis) arising from any negligence or wrongful actions of the County or its employees.

7. Any dispute in relation to this Agreement shall be dealt with pursuant to the dispute resolution provisions set out in the ICF.

IN WITNESS HEREOF the County and the Town have executed this Agreement on the day and year first written above.

LAC STE. ANNE COUNTY	**TOWN OF ONOWAY**
_____	_____
(seal) _____	(seal) _____

Schedule "A"
Lac Ste. Anne County & Town of Onoway
Recreation Agreement Cost-Sharing

FACILITY/PROGRAM/SERVICE				
	2022	2023	2024	2025
Onoway & District Agricultural Society	$94,500.00	$119,500.00	$119,500.00	$119,500.00
Onoway & District Curling Club	$25,000.00	$25,000.00	$25,000.00	$25,000.00
Onoway & District Historical Guild	$1,500.00	$1,500.00	$1,500.00	$1,500.00
Onoway Golden Club	$3,000.00	$3,000.00	$3,000.00	$3,000.00
Onoway Ball Diamonds	$1,000.00	$1,000.00	$1,000.00	$1,000.00
	$125,000.00	$150,000.00	$150,000.00	$150,000.00

Any increase to the minimum contribution will be at Lac Ste. Anne County Council's direction, and subject to many internal and external factors.

Value of Services/Goods to ODAS (Arena)/Curling Rink/Heritage Centre/Ball Diamonds/Golden Club/Community Hall for 2021

	A	B	C	D	E	F	G
1	**Description**	**Hours/Volume**	**Value per Hour/Volume**	**Total Value**			
2	**ODAS - arena**						
3	Grading/Plowing	35 hours	$160.00/hr	$5,600.00			
4	Mowing	45 hours	$85.00/hr	$3,825.00			
5	Trimming	88 hours	$75.00/hr	$6,600.00			
6	Sanding	12 hours	$176.00/hr	$2,112.00			
7	Sand/Salt blend	70 tonne	$57.00/tonne	$3,990.00			
8	Use of Council Chambers	12	$25.00	$300.00			
9	for meetings						
10	**Value of inkind contributions annually**			**$22,427.00**			
11	**We have been providing $7,000.00 annually as well (3 yr commitment)**						
12							
13							
14	**Curling Rink**						
15	Grading	30 hours	$160.00/hr	$4,800.00			
16	Mowing	50 hours	$85.00/hr	$4,250.00			
17	Trimming	60 hours	$75.00/hr	$4,500.00			
18	Sanding	9 hours	$176.00/hr	$1,584.00			
19	Sand/Salt blend	50 tonne	$57.00/tonne	$2,850.00			
20							
21	**Value of inkind contributions annually**			**$17,984.00**			
22	**Cash Donation (2021)**	**$4,000.00**					
23							
24							
25	**Heritage Centre**						
26	Grading/Plowing	20 hours	$160.00/hr	$3,200.00			
27	Sanding	7.5 hours	$176.00/hr	$1,320.00			
28	Sand/Salt blend	40 tonne	$57.00/tonne	$2,280.00			
29							
30	**Value of inkind contributions annually**			**$6,800.00**			
31							
32							
33							

2022-02-09

Value of Services/Goods to ODAS (Arena)/Curling Rink/Heritage Centre/Ball Diamonds/Golden Club/Community Hall for 2021

	A	B	C	D	E	F	G
34	**Community Hall**						
35	Grading/Plowing (haul away)	30 hours	$160.00/hr	$4,800.00			
36	Sanding	3 hours	$176.00/hr	$528.00			
37	Sand/Salt blend	3 tonne	$57.00/tonne	$171.00			
38	Mowing/Trimming	10 hours	$75.00/hour	$750.00			
39	Water/Sewer			$1,000.00			
40	Power/Gas			$7,200.00			
41	Repairs/Maint			$5,000.00			
42	Insurance			$5,600.00			
43							
44	**Value of inkind contributions annually**			**$25,049.00**			
45							
46							
47	**Ball Diamonds (2019)**						
48	Mowing	192 hours	$85.00/hr	$16,320.00			
49	Grading	4 hours	$160.00/hr	$640.00			
50							
51	**Value of inkind contributions annually**			**$16,960.00**			
52							
53							
54	**Golden Club**						
55	Grading	3 hours	$160.00/hr	**$480.00**			
56							
57							
58							
59	**Tax Equivalent should property not be exempt - based on 2020 assessments used for 2021 tax purposes:**						
60		Assessed Value	Mill Rate	Municipal Taxes	Road Levy	Recreation Levy	**Total Municipal Tax Equivalent**
61	ODAS	$1,111,300	0.01975	$21,948.00	$120.00	$50.00	**$22,118.00**
62	Curling Rink	$264,000	0.01975	$5,214.00	$120.00	$50.00	**$5,384.00**
63	Guild/Museum	$2,316,200	0.01975	$45,745.00	$120.00	$50.00	**$45,915.00**
64	Community Hall	$278,400	0.01975	$5,498.00	$120.00	$50.00	**$5,668.00**
65	Golden Club	$181,700	0.01975	$3,588.00	$120.00	$50.00	**$3,758.00**

The Road Ahead:

A Vision for Onoway's Future

"Onoway is a community where educational opportunities, economic prosperity and an ethic of cooperation and community involvement are pursued within the context of economic and ecological resilience and regional self-sufficiency.

Situated in the Lac Ste. Anne region, at the hub of major transportation routes, Onoway strives for balanced business development, environmentally sustainable industry, and ample recreational opportunities, while maintaining our friendly, respectful small town atmosphere.

Onoway honours our community's history, supports our youth, and is committed to partnership building."

(Town of Onoway Vision Statement approved by Town Council, December 16, 2010)

VISION STATEMENTS

MAYERTHORPE

Mayerthorpe will adapt and evolve to celebrate its history while growing its future.

COUNTY OF BARRHEAD

To foster a strong, healthy, and proud rural community

TOWN OF BARRHEAD

Live. Play. Thrive.

TOWN OF MORINVILLE

Embracing our past; building pride in our future

BRAZEAU COUNTY

Brazeau County fosters RURAL VALUES, INNOVATION, CREATIVITY, LEADERSHIP and is a place where a DIVERSE ECONOMY offers QUALITY OF LIFE for our citizens.

TOWN OF STONY PLAIN

"A strong, vibrant community where we respect our heritage, embrace the present, and are excited about our future."

CITY OF SPRUCE GROVE

The City of Spruce Grove is the best place to live, to experience community and to grow a strong, successful business.

YELLOWHEAD COUNTY

Recognized as a place of choice for those who want to be where great things happen.

BROOKS ALBERTA

Brooks. A community that people are proud to call home.

CLARESHOLM, ALBERTA

"Claresholm, a thriving community offering quality family living that encourages economic prosperity through innovative and progressive thinking."

EDSON

A healthy, thriving, engaged community.

HINTON, ALBERTA

Respectful of our past, creating our future, Hinton is a community of opportunity – as an active, culturally rich, safe environment in which to grow.

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Wendy Wildman

From: seanm@rdecagroup.com
Sent: January 2, 2019 8:20 AM
To: 'Wendy Wildman'
Subject: RE: Communications Firm - New Logo
Attachments: Proposal_Onoway_010119.pdf

Good morning Wendy,

Happy new year! As requested, please find attached my recommendations and budget estimate for rebranding the Town of Onoway. I look forward to discussing this project with you further.

Thank you again for the opportunity to present our proposal, and I hope to chat with you soon.

Best Regards,

Sean Mellis
President, Chief Creative Officer

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STRATEGIC COMMUNICATION MANAGEMENT
ENGAGE | INFORM | EMERGE

2319A Richmond Road SW | Calgary AB Canada T2T 5E3
Telephone 403.286.2104 | Mobile 403.613.9871

seanm@rdecagroup.com www.rdecagroup.com

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From: Wendy Wildman <cao@onoway.ca>
Sent: December 17, 2018 8:07 AM
To: seanm@rdecagroup.com
Subject: FW: Communications Firm - New Logo

Good morning Sean. I got your contact info from Lac Ste. Anne County.

Would like to have a conversation about you designing a new logo for the Town of Onoway.

Look forward to starting the conversation!

W

Wendy Wildman
CAO
Town of Onoway
Box 540
Onoway, AB. T0E 1V0
780-967-5338 Fax: 780-967-3226

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Logo Redesign & Brand Management Support Proposal

Submitted in confidence to:

Wendy Wildman
Chief Administrative Officer
Town of Onoway
cao@onoway.ca

January 1, 2019

Rdeca Group Inc.
1025 10 Street SE
Calgary, Alberta T2G 3E1
Tel.: 403. 286.2104
Fax: 403.206.7061
Email: seanm@rdecagroup.com

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Logo Redesign & Brand Management Support Proposal

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Response to Requirements

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BACKGROUND

The Town of Onoway is contemplating a refinement of its legacy brand, beginning with a redesigned logo. In this document we have provided a set of recommendations and associated fees for the design and deployment of a new branding program, including consideration for designing some initial brand assets such as stationery, business collateral, fleet decals, or other touchpoints the Town deems important.

Please note that some of the cost assumptions herein are subject to a better understanding of project scope. Further dialogue is required in order to determine specific parameters for elements such as sub-brands, touchpoints and overall brand strategy. However, this document provides a baseline for how we would undertake a municipal rebranding project such as this.

PROJECT METHODOLOGY

We propose the following methodology for the design and deployment of a new brand program for the Town of Onoway. Three sets of deliverables have been identified in order to achieve project success:

1. Current State Research

- Audit and evaluation of legacy brand identity and brand touchpoints; and
- Distillation of research into an actionable set of recommendations

We will provide seasoned, non-judgmental assessment of the legacy Onoway brand and associated touchpoints. The outcome of our research and recommendations will provide a baseline for the Town's brand strategy.

2. Creative Development

- Creation of the Town of Onoway brand identity and design system

We will work with the Client to design a new logo and develop the visual language for the Town of Onoway brand family. Deliverables in this phase include, but are not limited to, logo design; and design of key brand touchpoints such as stationery, business collateral and other brand assets (to be explored further).

3. Brand Management

- Development of brand guidelines; and
- Post-launch design recommendations and support

We will work with the Client to create a framework for ongoing brand management. Deliverables include development of brand usage specifications (the brand bible); and the short-term provision of post-launch branding recommendations and support.

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ESTIMATED BUDGET

Our objective is to create a brand foundation that will empower the Town of Onoway to communicate with greater professionalism, consistency and impact. We aim to achieve this result by providing common sense brand strategy; professional logo design; brand management tools and procedures; and related design support services. An itemized cost analysis for the deliverables outlined in this document is indicated below.

These costs do not include heretofore unforeseen hard costs for ancillary goods or services that may be required. These costs will be explored with the Client, and will be itemized separately in our accounts.

Current State Research

Strategy session(s), brand audit and touchpoint audit	2,250

Creative Development

Logo and brand system design	7,500
Design of initial branded materials (5 touchpoints)	4,000

Brand Management

Development of brand usage guidelines	3,000
Post-launch communications support (10 hrs.)	1,100

Total Estimated Budget Before Tax	**17,850**

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Corporate Profile

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ABOUT RDECA GROUP

Rdeca Group helps local governments develop communications programs that are resourceful, professional and designed to deliver measurable value. From brand management, web development and content creation to public engagement, crisis communications and more, we deliver a spectrum of media solutions designed to help the public sector prosper.

Under the leadership of Sean Mellis, Rdeca Group's hybrid team of media professionals helps a variety of western Canadian clients navigate the ever-shifting waters of civic branding, communications and stakeholder relations. We leverage our services and technologies to maintain the highest standards of excellence and efficiency for progressive organizations seeking to do more to engage ratepayers, employees and municipal partners. Our commitment to setting the standard in civic communications is evident in every client engagement we hold.

- **More than 20 years of progressive experience in visual identity design and brand management**
- **Considerable dedicated expertise with municipal branding and communication design**
- **A proven ability to design and produce consistent and professional branded touchpoints**
- **A keen understanding of the importance of strict adherence to brand standards**
- **Considerable dedicated expertise in developing, launching and maintaining brand strategies**

HELPING THE TOWN OF ONOWAY THROUGH INSIGHT & EXPERTISE

We're confident in the significant value we can bring to the Town of Onoway. First and foremost, our firm has a lengthy and successful track record of providing exceptional service to municipalities across western Canada through brand management, strategic marketing, and communication design.

Our expertise in helping our municipal clients position themselves properly and communicate professionally is evident in our work for municipal organizations such as Rocky View County, the MD of Lesser Slave River, Lac Ste. Anne County, Gitxsan First Nation, the RM of Wilton and the Town of Slave Lake.

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Relevant Experience

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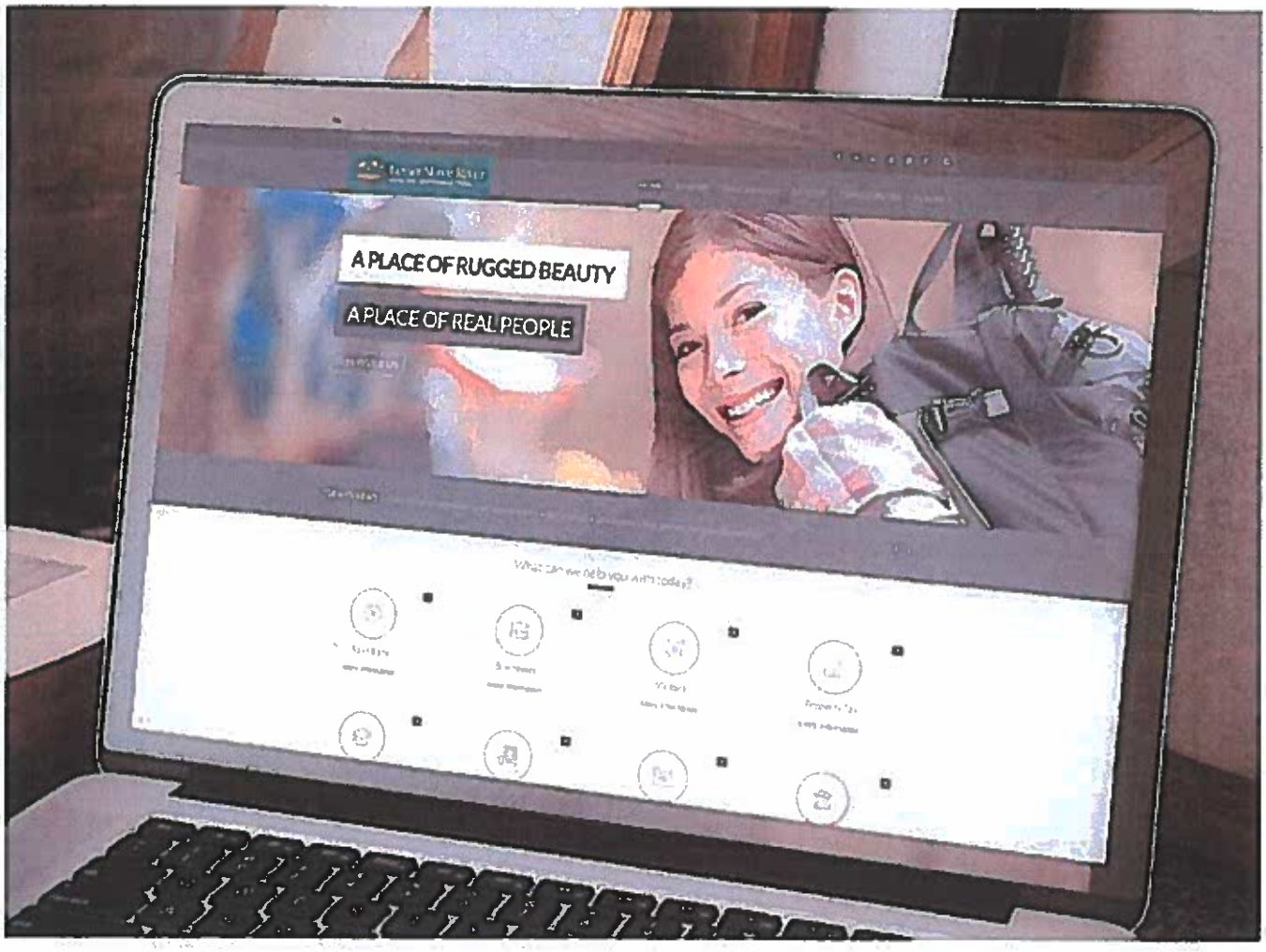
CASE STUDY 1: MUNICIPAL DISTRICT OF LESSER SLAVE RIVER

ENGAGEMENT PERIOD: 2011 - Present
WEBSITE: www.mdlsr.ca

In the early spring of 2011, Rdeca Group had begun talks with Lesser Slave River to develop a strategic, professional and consistent communications plan for the northern Alberta municipality. Following the mid-May wildfires that ravaged the Lesser Slave region, the role of communicating more effectively with residents, internal stakeholders and neighbouring municipalities became exponentially more critical.



We were given the ambitious task of branding a client who was still reeling from one of the worst natural disasters in Canadian history; a client who arguably had issues that trumped Pantone values or typographic standards. Following visits to the region and strategy sessions with the Lesser Slave team, Rdeca Group's recommendation was to evolve and realign a brand that, while flawed and fragmented, had achieved iconic status worldwide as a result of the tragedy.

At the core of the new Lesser Slave River communications strategy is an expansive website that engages locals in an authentic two-way conversation; that promotes the unique region to travelers and career-seekers; and that accurately and respectfully recounts the May 2011 wildfires.

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CASE STUDY 1: MUNICIPAL DISTRICT OF LESSER SLAVE RIVER (CONT.)

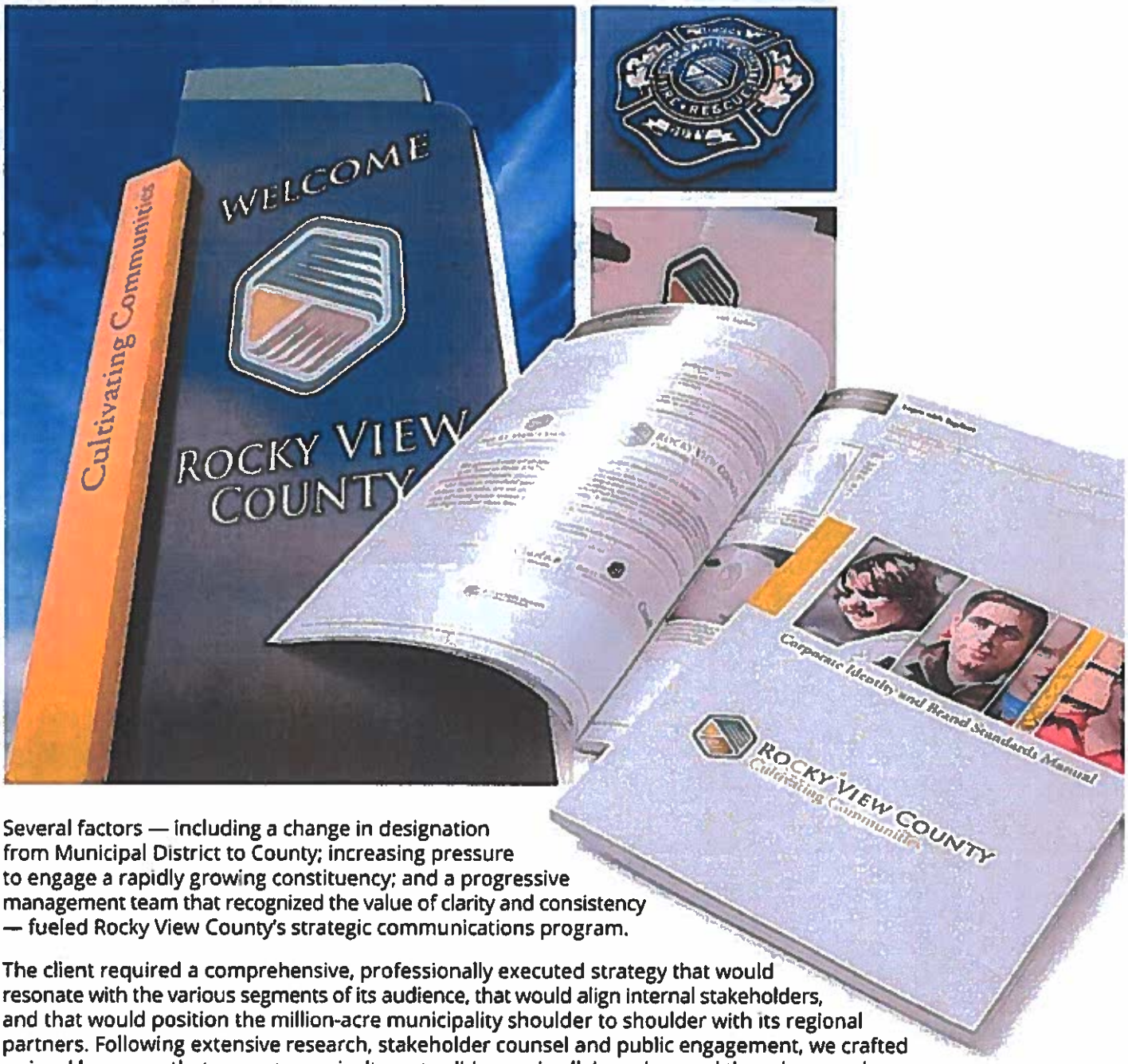
The Lesser Slave brand identity was evolved in tandem with the main deliverables of its communications program. While retaining the same graphic features and highly apropos "Rugged and Real" tagline, the new identity addresses fundamental deficiencies inherent in the legacy brand. Reworked with graphic coherence, typographic specs and a standardized colour palette, the massaged Lesser Slave River brand identity stands shoulder-to-shoulder with any progressive county or municipal district in North America.

KEY DELIVERABLES

Stakeholder Engagement
Brand Identity Redesign
Website / CMS Development
Content Management
Brand Standards Development
Brand Management Consultation
Proprietary Photography / Videography
Marketing Communications
Social Media Management

CASE STUDY 2: ROCKY VIEW COUNTY

ENGAGEMENT PERIOD: 2009 - 2013
WEBSITE: www.rockyview.ca



Several factors — including a change in designation from Municipal District to County; increasing pressure to engage a rapidly growing constituency; and a progressive management team that recognized the value of clarity and consistency — fueled Rocky View County's strategic communications program.

The client required a comprehensive, professionally executed strategy that would resonate with the various segments of its audience, that would align internal stakeholders, and that would position the million-acre municipality shoulder to shoulder with its regional partners. Following extensive research, stakeholder counsel and public engagement, we crafted a visual language that connotes agriculture, tradition and collaboration, and that also pays homage to the geography that provide the county's namesake.

CASE STUDY 2: ROCKY VIEW COUNTY (CONT.)

The brand strategy for Rocky View County extends far beyond a logo and tagline. Rdeca Group designed touchpoints that span stationery, fleet graphics, trade show displays, apparel, marketing communications templates, brand movie, and countless other applications. Wherever possible, proprietary photography was used to further pin the new brand to the those who live and work within the county's borders.

A comprehensive brand standards manual was developed to ensure consistent identity management throughout the organization and across all touchpoints.

KEY DELIVERABLES

Stakeholder Engagement
Brand Identity Redesign
Sub-branding System Design
Brand Standards Development
Brand Management Consultation
Marketing Communications
Media Relations

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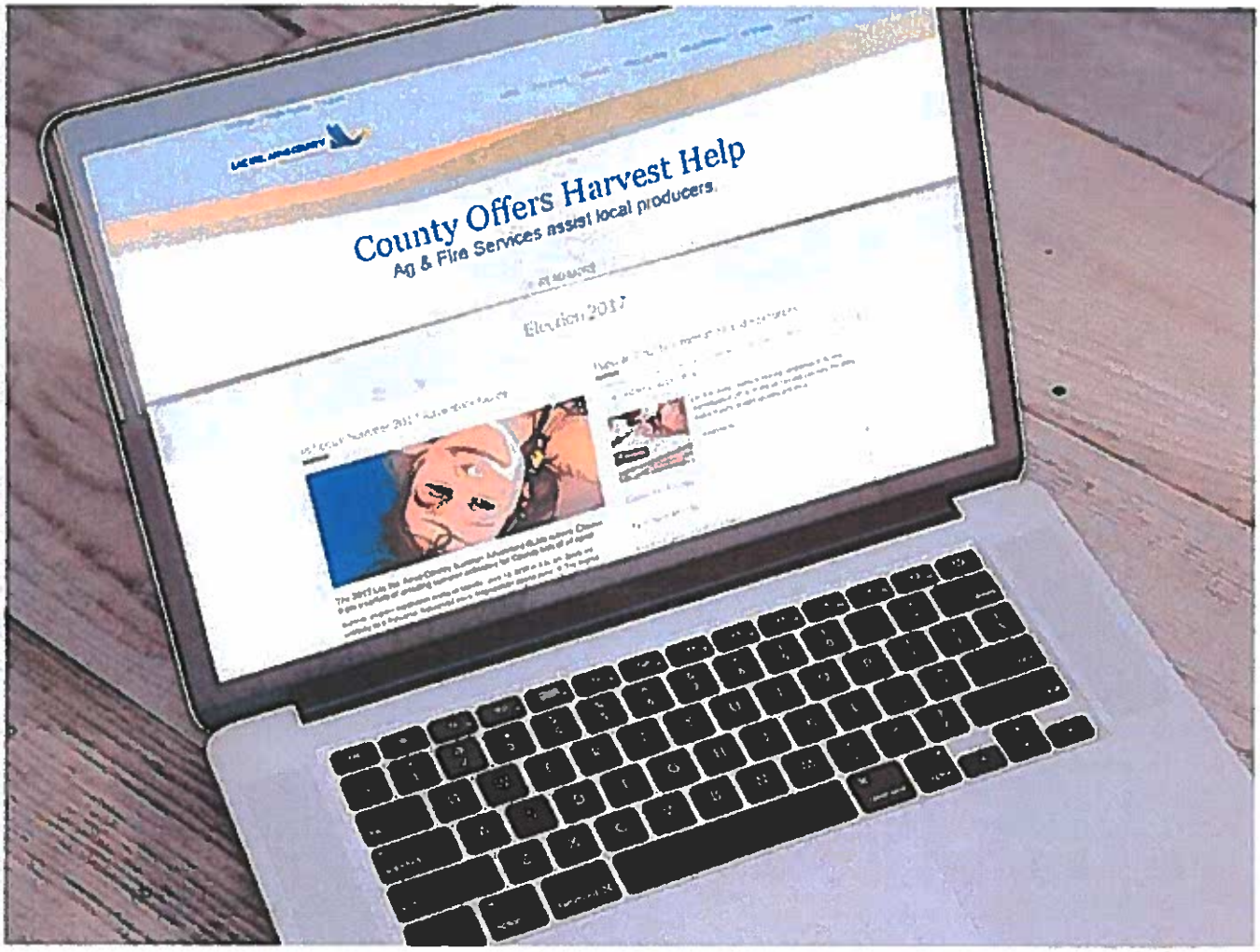
CASE STUDY 3: LAC STE. ANNE COUNTY

ENGAGEMENT PERIOD: 2015 - Present
WEBSITE: www.lsac.ca

Lac Ste. Anne County is a rural municipality located about an hour due west of Edmonton, Alberta. Like many rural municipalities in Western Canada, they consistently strive to do more with less in many areas, including business development and stakeholder engagement. Faced with evolving communications needs and lacking the in-house resources to achieve their goals, the County reached out to Rdeca Group.



The overarching objective of our engagement with Lac Ste. Anne County was to help the client grow a sensible, manageable and scalable communications program with a redesigned County website at its core. We began by meeting with the County's management team to take an inventory of wants, needs and must-haves for the new website. These initial strategy sessions helped us develop a practical informational hierarchy - a vital foundation to support the breadth and depth of any municipal website.

Town of Onoway

Administrative Policy

Number	Title			
A-ADM-FEE-1 (2.11)	ADMINISTRATIVE FEES – GENERAL INVOICING			
Approval	Originally Approved		Last Revised	
(CAO initials)	Resolution No:		Resolution No:	367/20
	Date:	Nov 14, 2006	Date:	Nov 19, 2020

Purpose

It is recognized that the municipality must be good stewards of the employees' time and of the public purse. Cost recovery for services provided is a guiding principle in the Town's business plan. An administrative fee charged on general invoices for services other than utilities or garbage bins billing will assist in covering the cost of staff time for generating the invoices.

Policy Statement

On all General Invoices generated from the administration office for services such as, but not limited to, fire calls, bylaw enforcement issues or charges for public works staff and/or equipment, an administration fee of 15% may be added. This fee is to assist in the cost recovery of staff time, office supplies and mailing costs. An administration fee of $25.00 will be charged to the tax account upon transfer of fees to that account.

Should the invoice remain unpaid after 30 days, the invoice shall have a penalty rate of 15% per annum (1.25% per month) interest will be charged on overdue accounts. Where possible, after 60 days, a council motion will be obtained to transfer the total charge to the tax roll of the person to whom the invoice was sent.

Should the administrative office require the services of an outside resource, such as legal counsel, to address issues related to invoicing, any costs associated to the use of the resource shall be included in the account invoice.

The CAO or designate may, at his/her sole discretion, waive the terms of this policy.

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Town of Onoway

Administrative Policy

Revisions:

Resolution Number	MM/DD/YY

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Town of Onoway

Administrative Policy

Number	Title			
A-HUM-COD-1 (3.26)	Human Resources Code of Conduct			
Approval	Originally Approved		Last Revised	
(CAO initials)	Resolution No:	228/15	Resolution No:	473/18
	Date:	June 4, 2015	Date:	Dec. 19, 2018

POLICY STATEMENT

To create, provide and maintain an equitable, positive, safe and rewarding work environment for all employees.

PURPOSE

1. To promote and maintain a harmonious and co-operative relationship between the Employer and Employees.
2. To document personnel practices and policies of the Town of Onoway.
3. To ensure there is a clear understanding of the terms, conditions and requirements governing employment with the Town.
4. To provide for the safety and welfare of the Employees, the economy of operation, protection of the property and welfare of the public and the Employer.
5. To provide a fair and effective system of personnel administration.
6. To assist the Town in providing quality service to the ratepayers and residents of the Town.

PRINCIPLES

2.1 Employee Hiring

1. Council shall manage and conduct the hiring process for the position of Chief Administrative Officer.
2. The Chief Administrative Officer is responsible for recruitment and hiring of all Employees that report to the CAO.
3. Department Managers are responsible for recruitment and hiring of their department Employees.
4. Equal opportunity for employment will be provided to all qualified candidates.
5. Job offers shall be contingent on the applicant's agreement to the offer, acknowledgement of company policies, successful reference and background checks, and any other condition applicable to the position that are required of the Employee. (i.e. criminal record check, driver's abstract).

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Relatives of Employees, Chief Administrative Officer (CAO) or Council may be considered for temporary employment with the Town provided they:

- have made application for employment through the regular process;
- have been considered in accordance with established employment policies and procedures;
- possess the necessary qualifications;
- are considered to be the most suitable candidate;
- are not supervised by, or work directly with, their immediate family member.

6. All documentation required for a new Employee must be completed and submitted prior to the Employee beginning employment.
7. Offer letters will include any terms and conditions of employment.

2.2 Orientation

1. Employee orientation will be provided, and will include review of Town policies, rules and regulations, and other job-specific information designed to assist the Employee in their duties.
2. Adolescent and young workers (18 and under) will be provided with further orientation, if required as per Alberta *Employment Standards Act*.

2.3 Probationary Period

1. A new Employee will be on Probationary Period for six (6) months. This period and any extensions should be referred to as the "Probationary Period".
2. The Town, without notice or payment in lieu of notice, may terminate employment during the Probationary Period.
3. An Employee who is promoted or is selected for employment via an internal transfer shall serve a three (3) month Probationary Period before appointment is made permanent. In the event the Employee is not successful in the new position after Probationary Period, and their old position has been filled, the Employee may be terminated by way of reasonable notice or payment in lieu thereof as required by law.
4. Department Managers and/or the Chief Administrative Officer may extend Probationary Period an additional three (3) months if warranted or required.

2.4 Performance Management

1. The Town is committed to continuous Employee performance management and development.
2. All Employees and Department Managers may be subject to annual performance reviews, at the discretion of the Chief Administrative Officer.
3. Ongoing Employee performance reviews are based on a calendar year of January 1 to December 31.

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2.5 Ending Employment

1. Termination of employment may take place upon the initiation of either the Town or the Employee.
2. Termination by the Employer or the Employee will be consistent with the Alberta Employment Standards Code and the Employees employment offer letter.

2.6 Personnel Record Documentation

1. Individual personnel files shall be established on all Employees and kept up to date and maintained by the Chief Administrative Officer or designate as part of the payroll records. Personnel files shall be reviewed every year to ensure up-to-date information and records are on file (i.e. certification, tax forms, etc.).
2. An Employee's file shall be established at the date of employment and permanently retained by the Town as per the Town's records retention policy.
3. Each Employee's individual personnel file shall contain all pertinent documents relating to the Employee's status and job performance.
4. Employees have access to their own personnel files, with the exception of confidential reference letters. It is the responsibility of the Employer to ensure that personnel records contain all current Employee development information.
5. No Employee other than the Chief Administrative Officer or Department Manager of the Employee shall be permitted to examine any personnel file other than their own.
6. Any release of information will be provided only with the expressed written consent of the Employee and in compliance with the Alberta *Freedom of Information and Privacy Act.*

2.7 Employee Reservations

1. Employees recognize the right of the employer to hire, discharge, promote, demote, transfer, suspend, or otherwise discipline any employee subject to the terms of this policy
2. Employees further recognize the undisputed right of the employer to operate and manage its business, in all respects, in accordance with its obligations and to make and alter from time to time, rules and any regulations to be observed by the employees.
3. The Employer, in terminating the employment of permanent employees, shall provide notice or pay-in-lieu of notice in accordance with the Employment Standard code and as per the Town's Employment Offer Letter. Notice is not required where an employee is terminated for "just cause".
4. Promotions and lay-offs shall be made on the basis of ability and merit of the employee. Length of service need not be a consideration.
5. The employer agrees not to discriminate against any employee on the basis of race, creed, color religion, sex or age.

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6. The employer in its sole discretion, and in the interest of safety, retains the right to require drug and alcohol testing should they feel that there is just cause and that the employees are unable to safely perform their duties.

Legal References: Alberta Employment Standards Act, Alberta Employment Standards Code
Cross References:
Revisions:

Resolution Number	MM/DD/YY

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